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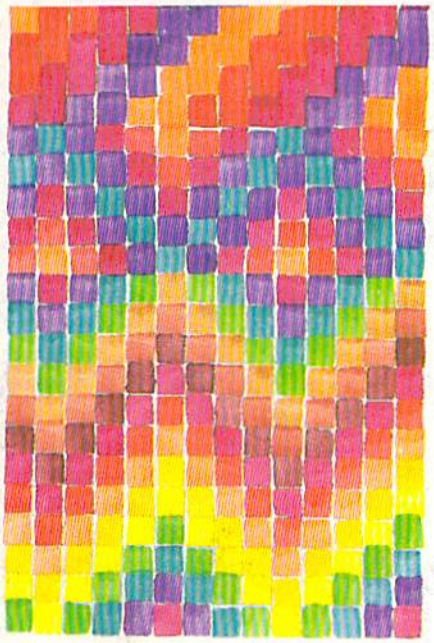

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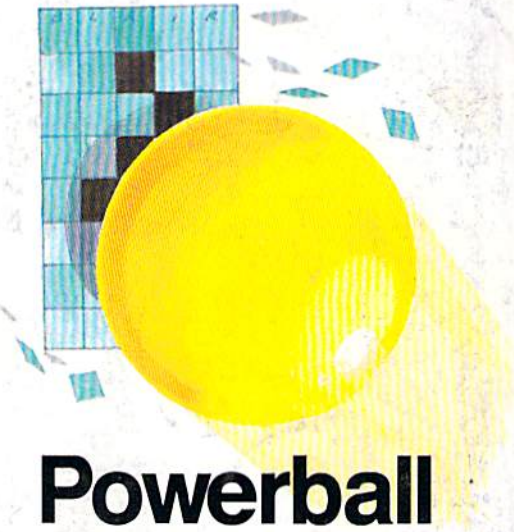

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- A Guide To Commodore User Groups, Part 1
- Fast Boot For The 128
- Hints & Tips: Time Savers
- And More

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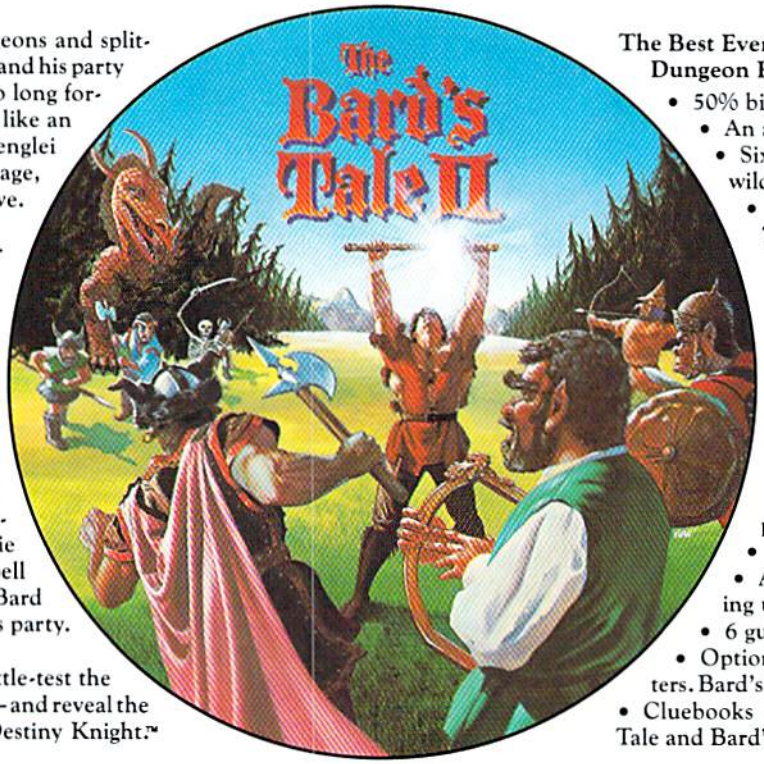

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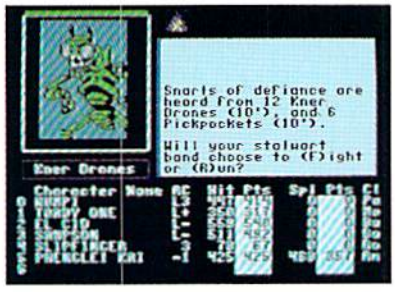
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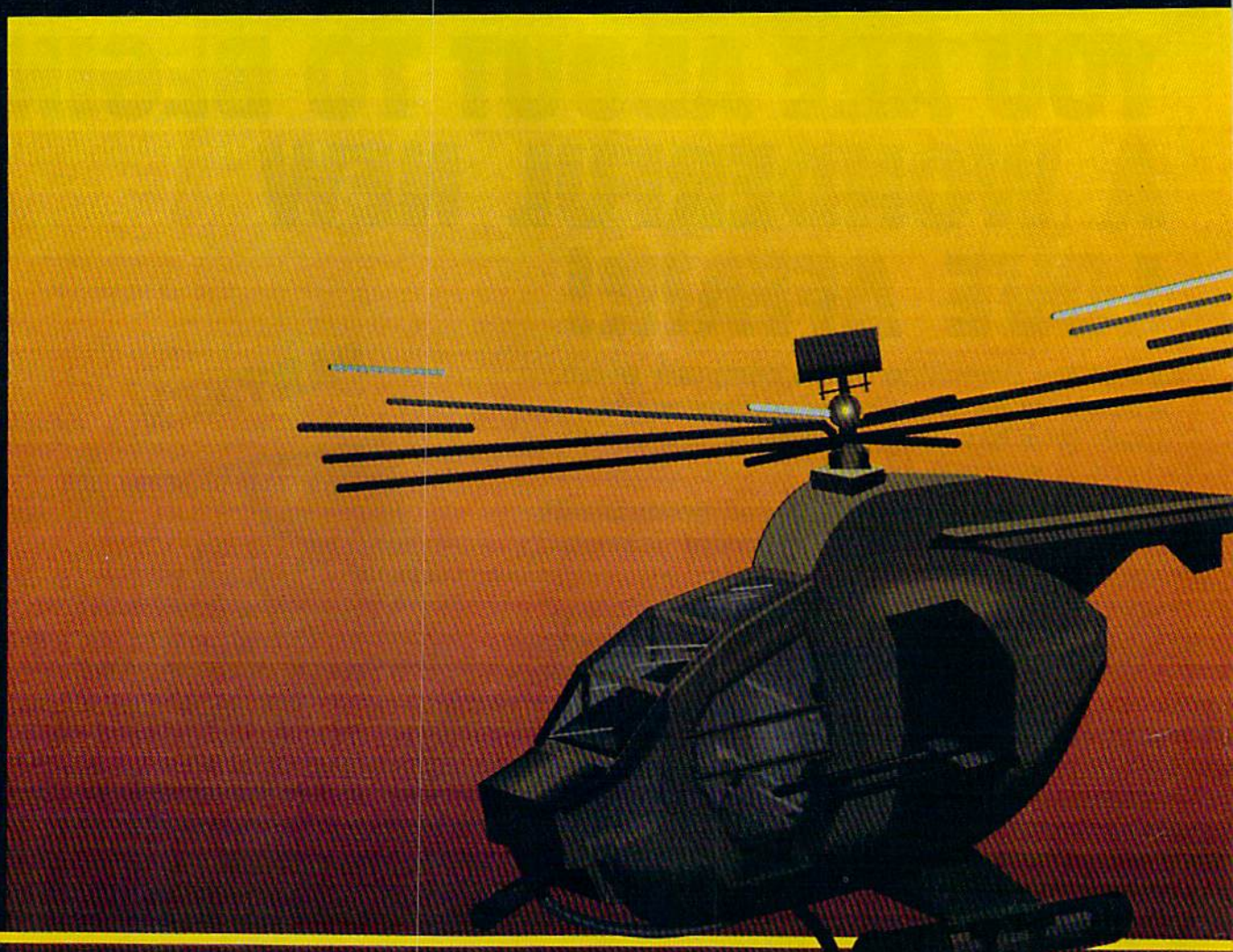

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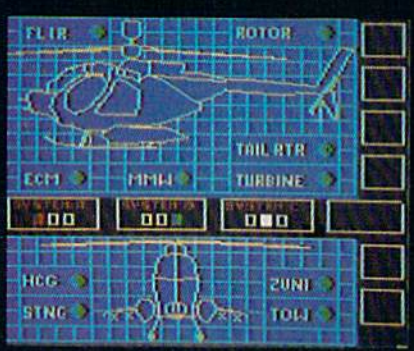

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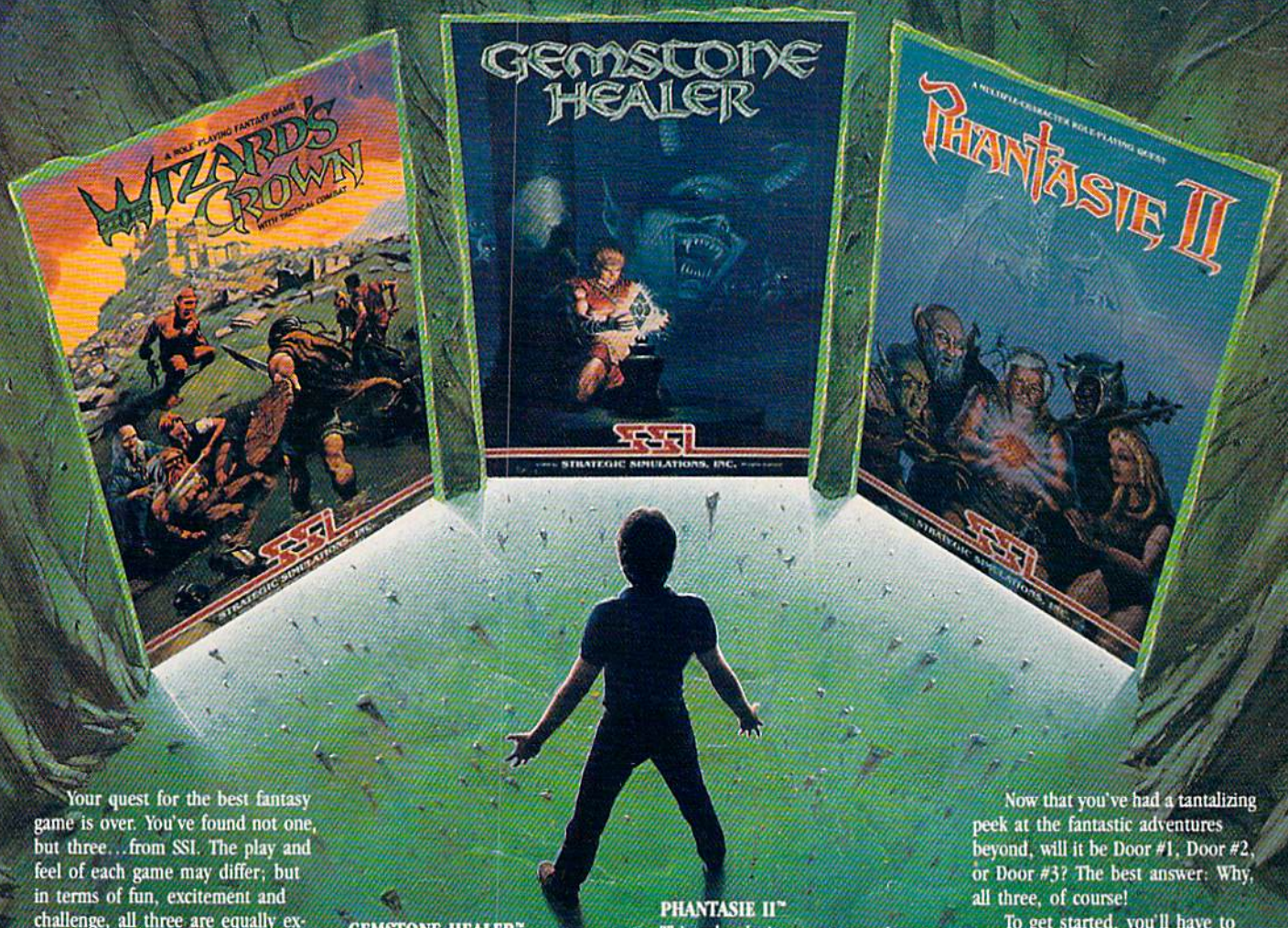

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*=General, **V**=VIC-20, **64**=Commodore 64, **+4**=Plus/4, **16**=Commodore 16, **128**=Commodore 128

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editor's notes

In this issue you'll find the latest version of the most popular program we've ever published: *SpeedScript*, a fast, full-featured, yet easy-to-use word processor. *SpeedScript* 3.2 includes many of the improvements that you, the readers, have requested.

Elsewhere in this issue, you'll find three very helpful support utilities for *SpeedScript*, each of which is designed either to save you time or help better organize your *SpeedScript* text files.

If you enjoy games, we think you'll find "Powerball" irresistible. While it takes some time to become expert, this exciting game is novel, varied, and challenging enough for anyone to enjoy. Also, you'll want to take a look at "Dazzlers," a series of graphics programs for the 64 that animate the standard text screen, with some surprising results.

Readers who have been with us for some time are likely to agree that the quality of the articles and programs in this issue does not come as a surprise; rather it's part of a tradition established by Robert Lock, the founder of COMPUTE! Publications.

This past December Robert withdrew from the daily management of the company and accepted the position of Editorial Consultant. He will continue to provide the company with guidance and will assist, in particular, in the development of new products and services.

This change in editorial management gives us our first opportunity to publicly acknowledge his contributions to the growth and success of the company he founded and to the personal computing industry as a whole.

In all these years he has never given an interview or in any fashion moved his personality into public view. While some other industry leaders appeared more concerned at times with their personal image than with the health of their companies, Robert has always worked quietly behind the scenes. We can, however, with this editorial, recognize his contribution and thank him in a small way for his efforts.

He was in his early thirties when he had the idea of starting a magazine devoted to consumer computing. And in the past seven years COMPUTE!, under Robert's guidance, has grown into a highly successful publishing group—four magazines, over 150 books in print, and over 1,000,000 readers a month. COMPUTE! Publications has become a major contributor to the ongoing introduction of computing into the homes, schools, and businesses of America and elsewhere in the world.

He saw early on that computers would have an immense impact. Starting in a storefront in Greensboro, with a handful of employees, he began working on the early issues of COMPUTE!. At that point, he was personally involved in every aspect of his young magazine: He pasted up galleys, called advertisers, contacted authors, and edited copy.

As the years went by, he continued to directly supervise the growing company in both its editorial and business activities. He has an intuitive grasp of business and finance combined with strong editing and writing skills. This combination of talents is as rare as it is powerful. And perhaps even more rare: He is an extremely clear thinker. Those of us who work closely with Robert have always been aware that he is remarkably accurate in his assessments on a wide range of topics.

We at COMPUTE! were not concerned during the notorious industry shakeout of 1984–85. We knew we would be among the survivors. In fact, COMPUTE!'s Gazette was introduced in the face of the shakeout, and became one of the strongest startups in magazine publishing history. We have gone on to publish a number of bestselling books and continue to feature some of the best programs, columns, and articles available on the subject of home and recreational computing.

It all began with a single idea, Robert's vision of how best to engage, entertain, and inform the reader about a powerful emerging technology that he saw would eventually affect every aspect of our lives. But a single idea, however accurate, rarely leads to the creation of a major publishing house. Thousands of others also began to see the importance of consumer computing by the end of the 1970s, and hundreds of publications were introduced. By 1983 there were 150 computer magazines competing for the attention of the reading public. Today there are only a few. That COMPUTE! Publications survived and flourished was largely due to Robert's strong leadership. The staff at COMPUTE!, and the readers who enjoy our efforts, are fortunate that he will continue to play a vital role, contributing to the direction of our publications as we grow.

In the coming years we will, with his help, preserve the traditions and values Robert established here. And we will expand, offering more comprehensive coverage as well as maintaining the quality of programs, tutorials, and features you've come to expect from COMPUTE! Publications.

Richard Mansfield
Editorial Director

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On the Road to Moscow . . .

As the German Wehrmacht approached the open steppes around Smolensk, the invasion of the Soviet Union was on schedule. At this rate, the army would capture Moscow and throw the Russians out of the European continent by the time the snows fell.

At the head of the Panzergruppe invading central Russia was General Heinz Guderian, the man who turned the potential of armor into the reality of Blitzkrieg warfare. Opposing him were masses of Soviet infantry and armor determined to defend their homeland, but untried in battle. With Guderian's armor and motorized infantry divisions approaching the ancient city, the stage was set for another encounter with the Nazi juggernaut.

Guderian simulates this critical campaign of World War II, using the acclaimed joystick-driven system from Gulf Strike. On the full-color scrolling map of central Russia, the German player must master Blitzkrieg tactics to encircle and overrun Soviet divisions and drive deep enough into Russia to make the capture of Moscow possible. At your command are infantry divisions, panzer regiments, motorized infantry, panzergrenadiers, even the 1st German Cavalry Division.

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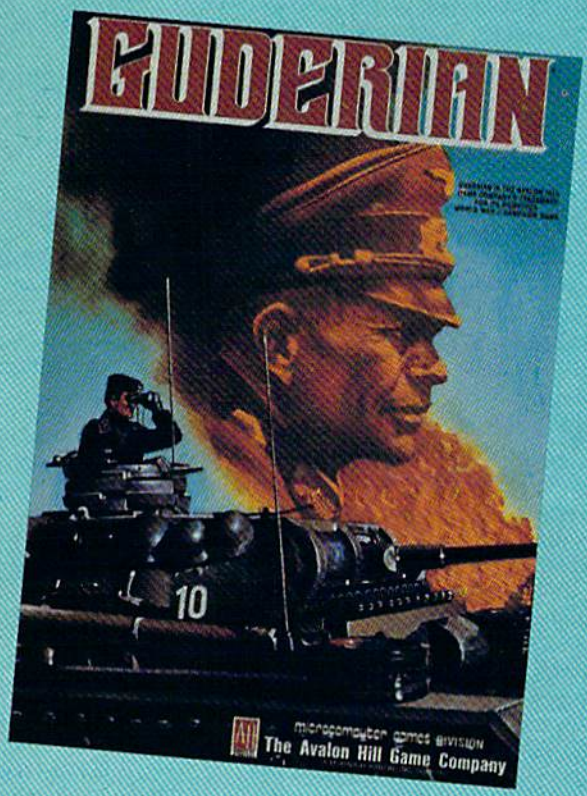
Guderian has a *solitaire option* allowing you to take command of either the German or Soviet armies, as well as overrun attacks, supply rules, Soviet leaders, rail movement and optional reinforcements. The rulebook introduces new players to historical gaming, explaining clearly concepts such as zones of control, supply, combat and movement. Planning map included.

The battle for Moscow was lost on the fields of Smolensk. Now is the time for you to re-create (and rewrite) history with **Guderian.**



German Panzers overrun Russian defenses west of Smolensk.

COMPLEXITY: Intermediate
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Do you have a question or a problem? Have you discovered something that could help other Commodore users? We want to hear from you. Write to Gazette Feedback, COMPUTE!'s Gazette, P.O. Box 5406, Greensboro, NC 27403. We regret that due to the volume of mail received, we cannot respond individually to programming questions.

Where, Why, And How?

I have a Commodore 128 and a 1571 disk drive. I'm fascinated by graphics and sound. First of all, where did sprites get their name? Why can only eight sprites appear on the screen at one time? Finally, how can voice synthesis be produced without extra hardware? I just got Epyx's *Impossible Mission*, which has voice synthesis, and I can't figure out where it's coming from.

Sean Raburn

If you look in the 64 Programmer's Reference Guide, *you'll find that the section that gives the technical specs for the VIC-II chip calls sprites Movable Object Blocks (or MOBs for short). This term never really caught on. Commodore's own 64 documentation (user's manual and reference guide) uses the term* sprites. *Two computers that were available before the 64 had sprites. On the Texas Instruments TI-99/4, sprites are called* sprites. *On the Atari 400/800, they're called* player/missile graphics.

The VIC-II chip which handles graphics on the 64 is the reason for the eight-sprite limit. There could have been more if the chip had been designed to support more, but the designers chose to provide eight. There's a machine language technique which does permit more than eight sprites on the screen at the same time as long as no more than eight appear on the same raster line. (A raster line is one of the thin horizontal lines that make up a video display. A Commodore video display consists of 262 raster lines.) Using a raster interrupt, you can draw eight sprites at the top of the screen, then change their locations to the bottom of the screen before the raster arrives there, effectively producing 16 sprites.

The voice in Impossible Mission *and other such games was digitized, not synthesized. It was recorded and then turned into a series of numbers that represent the sound. By reading through the numbers and carefully changing the frequency and volume of the three voices of the SID chip, the program creates a sound effect that sounds like a voice. For more about speech synthesis and digitization, see the feature articles elsewhere in this issue.*

Talking And Listening

I don't seem to understand what *download* means. When you download a program, is it from *your* disk drive or from the *other person's* drive? I don't understand uploading either.

Also, can two computers upload or download to each other with a modem and a terminal program?

Frederick J. Carleton

If you're sending the program, you're uploading. If you're receiving it, you're downloading. The difference between uploading and downloading is like the difference between talking and listening. Whenever data is transferred between two computers, one computer is uploading and the other is downloading. A way to remember is to pretend the other computer floats above your TV or monitor. To send to the other machine, the program has to flow up (upload). To receive a program, it flows down (download).

If you have a modem and a terminal program, you can upload to and download from a bulletin board service (BBS), telecommunications service, or a friend who also has a modem. To transfer files with a friend, you should set one modem to originate and the other to answer. There may be an O/A switch on your modem or you may have to send a command from the terminal program. There are a number of transfer protocols—Xmodem or Punter, for example—that strive to eliminate errors in data transfers. However, you can use these protocols only when the computers on both ends of the connection have terminal software that supports the same protocol. One of you—whoever is sending—then uploads while the other person downloads. For more about this topic, see "The Fundamentals of Downloading" in our February issue.

New Commands, A Better BASIC

A recent issue contained an advertisement for a cartridge which supposedly adds 42 extra commands to 64 BASIC. What interested me was the PRINT USING command. As you know, this command is not available on the 64. Data formatting is such a chore.

What do you think of this program? Is similar software available through other manufacturers? Could "MetaBASIC" be modified to add such a command?

Gregory Skoutas

If you're a machine language programmer, there are many ways to modify BASIC to support a variety of new commands. BASIC programmers may find a number of commercial programs that add new commands such as PRINT USING.

Some add-on programs are cartridges, while others are programs you load and run from disk. Most specialize in one area of programming. There are enhancement packages that provide lots of commands for hi-res graphics, for example. Others add routines to speed up disk operations and give you new commands for reading directories and doing other things with a disk. Still others give you new commands for program flow and program control.

An unfortunate side effect of all this is that if you have a program that changes BASIC, the program you write won't run unless the enhancement is in memory. The PRINT USING command won't work in standard 64 BASIC, and if you write a program with PRINT USING, it won't work on a friend's computer if your friend doesn't also own the enhancement program.

The idea behind "MetaBASIC" is that it adds commands for debugging and testing, but it doesn't add commands that work while the program is running. While MetaBASIC is in memory, you can read a directory or renumber a program, but when you've finished the program, it will work on a 64 or 128 that doesn't have MetaBASIC in memory. Adding a PRINT USING command would be possible, but it would go against the concept of MetaBASIC.

Wanted: Pascal For The 64

In school I'm studying *Turbo Pascal* on the TRS-80. I was wondering if there was a *Turbo Pascal* operating system for the 64? If there isn't, who sells a Pascal operating system similar to *Turbo*?

Chuck Wheeler

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Turbo Pascal *is an inexpensive and popular version of the Pascal language (it's not, strictly speaking, an operating system) made by a company called Borland International for computers that use the MS-DOS and CP/M operating systems.* Turbo Pascal *is not available for the 64. However, readers have reported that the 128 in CP/M mode can run the CP/M version of* Turbo Pascal.

There's no shortage of Pascal packages for the 64. We know of at least six: Super Pascal *(Abacus Software),* Zoom Pascal *(King Microware),* Kyan Pascal *(Kyan Software),* Oxford Pascal *(Systems Software/Oxford),* WATCOM Pascal *(WATCOM Publications), and* KMMM Pascal *(Wilserv Industries).*

For more about Commodore programming languages, see next month's GAZETTE.

Cursoring Around The Screen

I used to use this routine to move the cursor to the proper line before printing:

```
10 PRINT CHR$(19);:FOR P=1 TO
   N:PRINT:NEXT
```

The problem with this method is that I had to use trial and error to correctly position the cursor—there was no clear relationship between N and the line I wanted to print on.

I've switched to using

```
10 PRINT CHR$(19);:FOR P=1 TO
   N:PRINT CHR$(17);:NEXT
```

The cursor-down character works perfectly. Why the difference?

Robert M. Harvey

Type in this program and RUN it.

```
MG 10 PRINT"{CLR}";
BH 20 PRINT"012345678901234567
      8901234567890123456789";
GC 30 PRINT"{HOME}{5 DOWN}CURS
      OR CONTROLS"
RR 40 PRINT"{HOME}";:FOR P=1 T
      O 5:PRINT:NEXT P
BP 50 PRINT"PRINT STATEMENTS"
```

This program uses both strategies for positioning the cursor. First it uses PRINT statements to move down the screen, then cursor control characters. If you look carefully when the program runs, you'll see that both procedures work equally well in this case—both messages are printed on the same screen line.

To see why the first method is sometimes unpredictable, add another character to the long text string in line 10 of the program. RUN the program again. The routine that uses PRINTs puts a message down one line lower than the routine that uses cursor controls. This is because the PRINT uses all 40 columns of the screen.

When 40 or more characters are printed, two physical screen lines are joined to create one logical screen line. You can't tell the difference by looking at the screen, but the computer now considers the two lines as only one line. Any PRINT with 40 or more characters will change the "map" of the screen that holds the logical-line information. An empty PRINT statement always moves the cursor down by one logical line, whether that logical line is equivalent to one physical line or two.

Why does it happen? Consider what takes place when you type in a program line. A program line can occupy two screen lines on the 64. If the computer only could pay attention to one physical screen line at a time, full-screen editing would be impossible—you could change the part of the program line without the line number and press RETURN, but the computer wouldn't be able to recognize that line as a line of BASIC.

Since the PRINT and INPUT routines use the screen-editor routines, the difference between logical and physical lines applies when running BASIC programs as well as when entering them.

A Spritely 128

I know how to calculate sprite DATA statements, but I don't know how to display them with the 128's sprite commands. Could you please explain how to do this?

Roger Thinggaard

The 128 has an area of memory reserved for sprite definitions at 3584–4096 ($0E00–$0FFF). The 128's built-in sprite editor (which can be called by typing SPRDEF from immediate mode) stores sprites in this location, and BASIC 7.0's sprite commands assume that the sprites are defined in this area. There is enough room in this space for eight sprite definitions. If you use SPRDEF to create your sprites, you can begin using BASIC 7.0's special sprite commands without any problems. Unfortunately, your sprites will be lost when you turn off the computer's power. To save your sprites, use this line:

```
BSAVE "SPRITE",B0,P3584,P4096
```

Your program can load in the sprite definitions with a program line that looks like this:

```
10 BLOAD"SPRITE"
```

If you prefer to use a different sprite editor, or if you translate your sprites to DATA statements by hand, you can POKE your sprites into memory beginning at location 3584. Here's an example program:

```
XR 10 FOR T=3584 TO 3584+20:RE
      AD A:POKE T,A:NEXT T
RP 20 SPRCOLOR 2,9
CC 30 SPRITE 1,1,1,0,0,0,1
CR 40 MOVSPR 1,100,100
XX 50 MOVSPR 1,45#1
AQ 1000 DATA 85,85,85,106,128,
        1,110,128,1,127,128,1,
        110,128,1,106,128,1,65
        ,0,65
```

Line 1000 holds the data for one sprite. Line 10 POKEs it into memory. Line 20 sets the colors for multicolor sprites. Line 30 turns on the sprite. Line 40 puts the sprite at sprite position 100,100 on the screen. Line 50 starts the sprite moving.

More About The 1520

Several months ago, reader Anthony Wajda requested information about changing the device number of the 1520 printer/plotter. At that time, we did not have the instructions for making the change. Now, thanks to several of our readers, we can answer Mr. Wajda's question.

When it's shipped from the factory, the 1520 has a device number of 6. Commodore chose device 6 so it could be used with another printer which already had the standard printer device number, 4. Unfortunately, most programs expect the printer to be device number 4. To change the device number of the 1520, you must open the case (which will void your warranty, if it hasn't already expired). Be especially careful. Changing the device number involves soldering a trace on the circuit board. One slip with a soldering iron could ruin your 1520. If you are inexperienced in electronics, have a professional do the work for you.

First, unplug the printer from the wall socket. Then remove the four screws on the bottom of the printer case and remove the top of the case. Next, remove the four screws holding the circuit board in place and the two screws holding the heat sink. Separate the circuit board from the case and turn it over so that the green side is facing upward. Look for the largest IC chip on the board. It should be mounted on the lower left section of the board. Look at the bottom row of pins just to the right of center on the IC. You should see three "mushrooms" attached to three of the pins (pins 27, 28, and 29). You should also see two traces connecting the left and right mushrooms to a thick common trace. The 1520 is device number 6 because the trace between the middle mushroom and the common trace has been cut. If only the left trace were cut, the 1520 would be device 5 and if only the right trace were cut, it would be device 7.

To change the 1520 to device 4, you must connect the middle mushroom to the common trace. The first step is to scrape the green coating from the mushroom head and from the green area of the common bar (solder won't adhere to the coating). Finally, place a drop of solder on the two scraped areas and bridge the gap between the two. Caution! Do not leave solder traces anywhere else on the circuit board; this could damage your printer.

Put the printer back together and test your changes. You should now have a printer/plotter that responds to commands sent to device 4.

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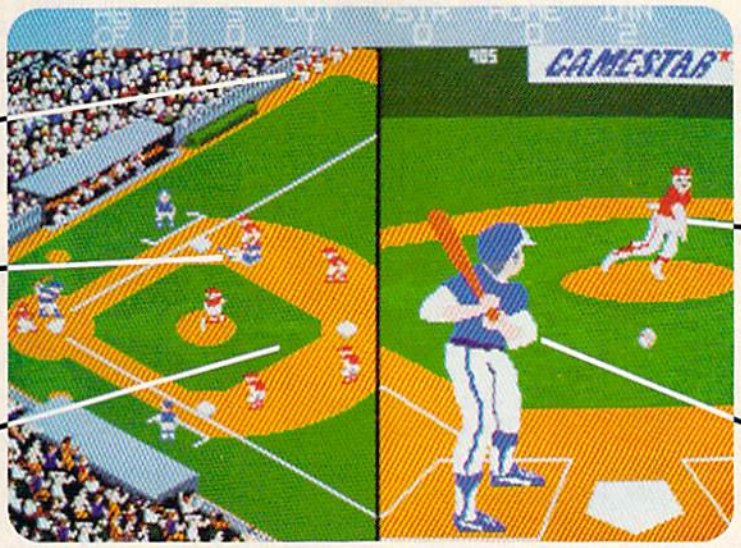

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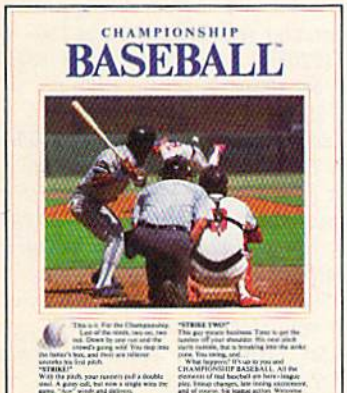

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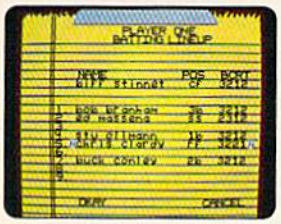

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GAMESTAR

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INPUT Doesn't Like Commas

Why is it that whenever you type a : or ; in an INPUT statement, the computer responds with ?EXTRA IGNORED, and then, when you print the data in the string variable, it cuts off everything past the colon or semicolon? Is there any way to prevent this?

Mark Jacobson

INPUT with semicolons works properly. You may have been thinking of the problem with commas. If you enter the one-line program ***10 INPUT A$: PRINT A$*** *and run it, you'll see the following results. What you type is in the left column. The right column shows what prints out.*

```
ABC,DEF   ABC
ABC;DEF   ABC;DEF
ABC:DEF   ABC
```

The ?EXTRA IGNORED error message appears when you use a comma, but not when you use a semicolon or colon. This error is one of the rare ones that doesn't stop the program. After the message prints, the program continues to the next command.

There's a good reason why commas cut off input. Within INPUT statements and DATA statements, commas are used to separate individual items. Change the example program to ***10 INPUT A$,B$: PRINT A$: PRINT B$*** *and then enter ABC,DEF. As you can see, a single typed line can assign strings to two different variables. Run the program a second time and type just ABC at the ? prompt. The program wants two variables, so it gives you a second prompt (two question marks).*

What seems like a problem with commas is really a feature of the INPUT statement, one that's valuable when you need to input several variables at once. The comma doesn't act as a comma character, it's a separator.

Colons also separate members of a list. The one-line programs above used colons to put more than one command in a program line. There's a machine language routine called CHRGET built into the 64. It's an all-purpose subroutine which gets characters from direct-mode commands, from program lines, while a program is running, and during INPUT. The CHRGET routine flags colons, which mark the end of one part and the beginning of the next. Since colons indicate the end of a section of a line, they also terminate an input from the user.

You may find situations where you want to include a comma or a colon within a string. One solution is to use GET instead of INPUT. Another is to start your string with a quotation mark, typing "ABC,DEF instead of ABC,DEF. By putting the string inside quotation marks, you'll be able to include these two problem characters. The quotation marks won't appear when the program prints the string. The only character that will prematurely terminate the string is a CTRL-@, because it's interpreted as a CHR$(0)—one of the other terminating characters.

Starting the string with a quotation mark is easy enough to remember if you're the only person using the program. But if others might run your program, you can force the quotation mark to print—on the 64—by putting ***POKE 631,34: POKE 198,1*** *just before the INPUT statement.*

Locating Custom Characters

I want to use custom characters for the 64 at locations 2048–6143 and I need to know what each address is used for. My memory map just says 2048–40959 are used for BASIC programs and variables. I know that locations 2048–2056 are the @ character, 2057–2065 are the letter *A*, 2066–2074 are *B*, and so on. I see the pattern, but could you list the rest of the addresses for me?

Tim Bankes

In the back of the manual that came with your 64 is an appendix that lists screen codes. When you copy characters from ROM to RAM, the characters appear in exactly the same order. Since each character uses eight bytes, multiply the number of the screen code by eight and add it to the address where you've put the custom characters. The letter T *is screen code 20, so the data for its shape starts at an offset of 20 times 8, or 160, from the beginning of the character set. Add 2048 and 160—the result (2208) is where the letter* T *begins. The heart shape is screen code 83, so it would start 664 bytes past 2048.*

Each character set contains 256 characters. The first 128 are listed in the appendix of screen codes. The final 128 are the reversed versions of the first 128 characters. Because there are 256 characters and each shape uses eight bytes, a complete character set takes up 2048 bytes.

A note about your math: Although a character takes eight bytes of memory, that doesn't mean that the first one runs from 2048–2056. It might look like eight numbers, but it's really nine. The first character uses the eight bytes from 2048–2055, the second runs from 2056–2063, and so forth.

There are two important facts about memory management that you should keep in mind if you plan to put the character set at 2048–4095. The first is that the VIC-II chip, which handles graphics on the 64, won't allow you to put characters between 4096–8191 or 36864–40959, because it sees the shadow of the ROM character set there. You can't store video information such as sprites or hi-res screens in these areas, either. If you keep the custom characters at 2048, you're safe. The second thing to watch for is that BASIC programs normally start at location 2049. To put characters at 2048, you'll need to move the start of BASIC up out of the way. ***POKE 43,1: POKE44,16: POKE 4096,0:NEW*** *will relocate the BASIC text area to 4097.*

The Absent-Minded Professor

I'm having a problem accessing the RAM under Kernal ROM from within a machine language program on my 64. I've narrowed the problem down to the modification of memory location 1 from 55 ($37) to 53 ($35). Included is an example. Do you have any idea what is causing the lockup?

Kenneth Taran

Imagine an absent-minded professor who conducts brilliant research in his laboratory. He gets so wrapped up in the work, he forgets to eat meals. Three times a day, an alarm goes off in the kitchen downstairs and an assistant prepares some food to bring up to the professor.

Within the 64, the chip that does most of the work is called the 6510—and it's an absent-minded professor. Sixty times a second (50 on European 64s), a second chip, the Complex Interface Adapter, has to nudge the 6510 and tell it to do some things like checking to see if a key has been pressed and blinking the cursor. The CIA #1 alarm clock generates an interrupt request (IRQ) and the IRQ sends the 6510 to an IRQ-handler routine where the keyboard is scanned and other chores are taken care of.

When you POKE (or STA) a 53 to memory location 1, the ROM at $E000–$FFFF is turned off and the RAM underneath is enabled. There's nothing wrong with switching ROM to RAM, except that the vector to the IRQ-handler routine (plus the handler itself) is located there. Within 1/60 second, an interrupt occurs and the 6510 tries to jump to the subroutine that does the housekeeping chores. But the subroutine is gone, because ROM has been replaced with RAM, which contains a series of random bytes. In an attempt to execute these instructions which aren't instructions, the computer locks up.

The solution is to disable IRQs with the machine language SEI (SEt Interrupt disable) instruction. You can reenable interrupts with CLI (CLear Interrupt disable). Place the SEI just before you store a 0 to bit 1 of location 1. When you're done accessing memory under ROM, store a 1 to bit 1 and then CLI. Note that SEI (Set) turns off the interrupt alarm clock and CLI (Clear) turns it on again.

Amiga screen

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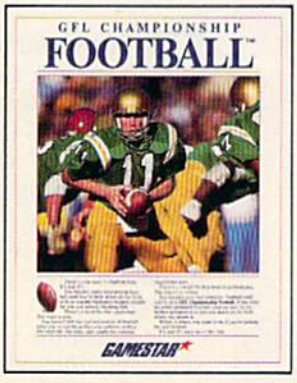

Whether you're taking on bone-crunching action against a friend, or going up against any of the 27 computer-controlled teams in the **GFL**, this is the one that puts you where the action is!

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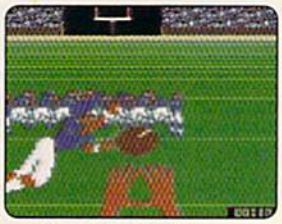
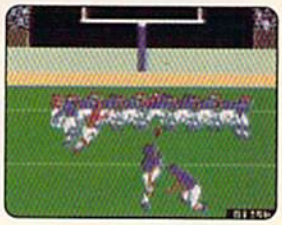
Amiga screen



Commodore 64-128 screen

Commodore 64-128 screen



Commodore 64-128 screen

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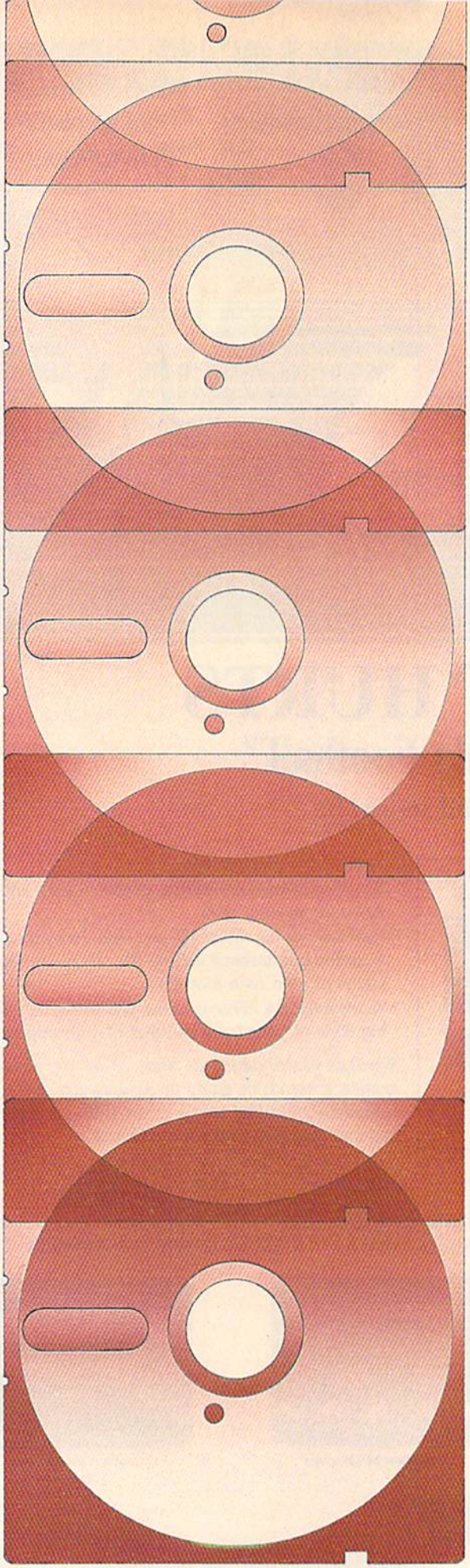

New Commodore Storage Devices

Selby Bateman, Features Editor

New data-storage devices for the Commodore 64 and 128 offer a variety of options beyond the 1541 and 1571 disk drives. Here's an overview of what's available, along with some considerations about how and why you may want to use them.

The Commodore 64 and 128 have already proven to be among the most popular and successful personal computers ever marketed.

The 64, five years old and going strong, has an installed base of several million. And the new 64C, with its *GEOS* operating system and applications, promises to continue that success. Sales of the 128, a machine first announced as recently as January 1985 and only widely available a few months later, already number more than a million.

One of the reasons for their continuing popularity is the relatively inexpensive and dependable disk drives that have helped to make the two computers more attractive.

Consider the 64's 1541. Despite criticisms about its lack of speed (512 bytes per second) and its limited memory capacity (160K), the 1541 was a remarkable bargain when introduced with the 64 in January 1982. Even at the original retail price of $600, the 1541 offered 64 users a significant storage device that far surpassed the popular Datassette tape recorders used by many 64 and VIC-20 computer owners. Of course, the price quickly dropped to half that, and today 1541 drives can be bought in some places for as little as $150.

The 128's 1571 drive is also a perfect fit, but for another reason: It's versatile enough to work in three different modes without the user having to make any physical modifications to the drive. To really get the most out of a 128 computer, you have to use the 1571.

The 1571 does its job at one of three different speeds: 1571 mode for the 128, 1541 mode for the 64 or 128, or CP/M mode. With the 128's ability to work in serial fast

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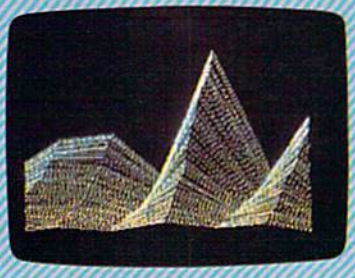

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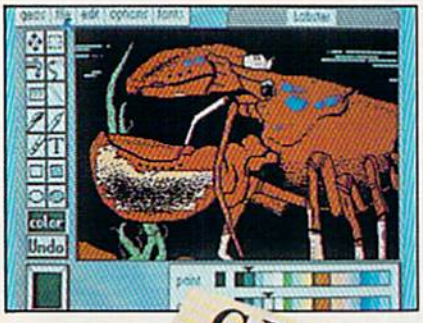

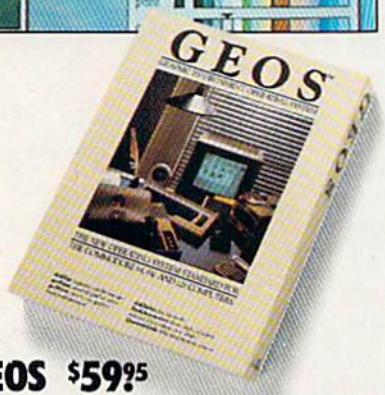

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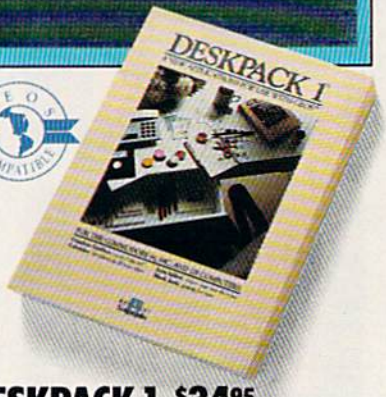
A collection of 20 more fonts for use with GEOS applications, in various shapes and sizes for more expressive and creative documents.



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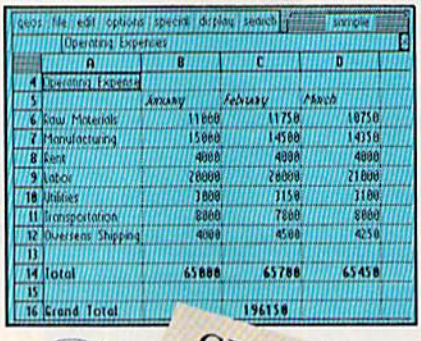
Four GEOS-compatible applications: Graphics Grabber for importing art from Print Shop,™ Newsroom™ and Print Master™ graphics; Calendar; Icon Editor and Black Jack Dealer.


Operating Expenses
A B C D
4 Operating Expenses
5 January February March
6 Raw Materials 11000 11750 10750
7 Manufacturing 15000 14500 14350
8 Rent 4000 4000 4000
9 Labor 28000 28000 21000
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11 Transportation 8000 7800 8000
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15
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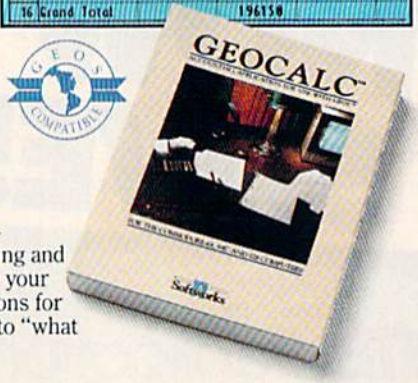

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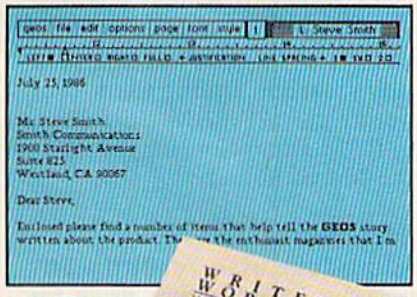

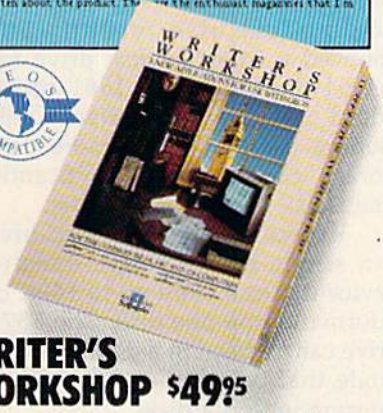

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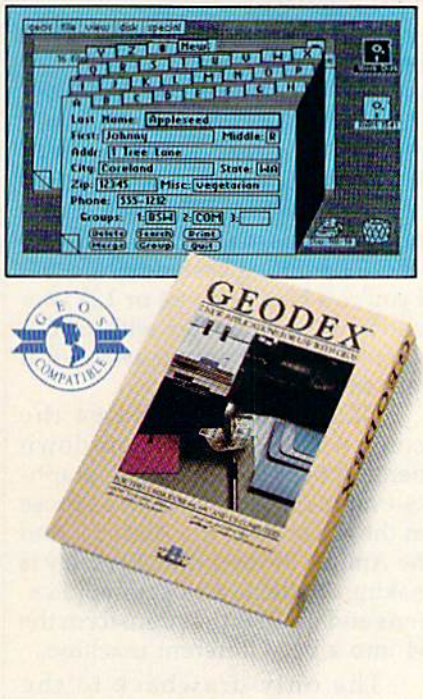

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Sooner or later, you're going to discover that there's more to Commodores than fun and games.

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Every GEOS application can take your Commodore from "mastering the universe" to a university master's degree, with all kinds of advanced capabilities that function at hyper-speeds you never imagined possible.

So if you're tired of toying with technology, try playing around with GEOS. Once you feel its power, you'll know that for anyone who still thinks Commodores are toys, the game's over.

Berkeley Softworks

The brightest minds are working at Berkeley.

mode as well as the slower 64 mode, its owners get three different computers working with data storage in three different manners.

Despite the successes of the 1541 and the 1571, Commodore recently introduced two new data storage and manipulation devices for the 64 and the 128. And a handful of third-party manufacturers continue to sell their disk drives and quick-load programs.

Expanding Memory

One of Commodore's two new devices is the 1764 RAM expander cartridge, which was announced at the Winter Consumer Electronics Show in January (see last month's issue). This long-awaited expansion module adds 256K of memory to the 64, plugging into the expansion port on the rear of the computer. Priced at about $129, the RAM expander offers 64 users four times the available memory. The original designers of the 64 could scarcely have envisioned such an add-on back in 1981 when they were building the computer.

For 64 owners, the RAM expander offers several potential options, each of which holds its own attraction, depending on the buyer's preferences.

For example, programmers in BASIC or machine language now have a vastly expanded playground for their programs. Learning to use the extra RAM efficiently and creatively will be challenging and—in the long run—can result in even more sophisticated programs.

Commodore provides two disks with their system. The first sets up the extra memory as a RAM disk, an area of memory that serves as another disk drive as long as the computer is turned on. The second disk provides RAM disk capability for the *GEOS* environment, as noted below. Treating the RAM as a disk allows easy and quick access of data for both BASIC and machine language programmers. For example, adventure games that have to access the disk drive at every turn could be rewritten to get the data from the expansion memory instead.

But the added RAM can help programmers do more than just speed up current programs—whole new techniques are possible. Full-screen realtime animation is one of the most exciting possibilities. Thirty-two 8K hi-res screens can be stored in the 1764 cartridge. Displaying these pictures sequentially allows 32 frames of high-quality animation.

Any data that uses a lot of memory—sound data, text, sprite and character definitions—can be stored in the expansion and moved into the main RAM when needed. For top performance, ML programmers may choose to bypass the RAM disk software and use the memory directly. BASIC programmers are likely to stick with the provided interface.

Easier, Faster *GEOS*

As mentioned above, the new RAM expander also brings a much faster, more efficient, and easier usage to Berkeley Softworks' *GEOS* operating system and applications. Commodore has named *GEOS* the official operating system for the 64. If you're a beginning 64 or 128 user who's not yet familiar with *GEOS*, you're likely to become aware of it very soon.

GEOS brings to the 64 the icons, windows, and drop-down menus that are a part of such graphics-oriented user interfaces as those on the Macintosh, the Atari ST, and the Amiga. Beyond that, Berkeley is making available a host of applications and utilities that transform the 64 into a very different machine.

The only drawback to the *GEOS* system so far has been that the 64's limited memory capacity required *GEOS* users to go through more disk access and manipulation than many people found comfortable. But with 256K of additional memory, *GEOS* users can now create a RAM disk—an area of memory within the computer that acts like an extremely fast disk drive. So, instead of having to load, save, and reload data from the 1541 drive, *GEOS* users can have near-instantaneous access through a RAM disk. Then, before turning off the computer, users can store the contents of the RAM disk in the 1541.

In the long run, if the 1764 RAM expander proves to be very popular among 64 users, it's possible that software companies will begin marketing some software packages that fully use the additional 256K. Imagine the kinds of screen graphics that could be used in games, or the speed-up and power of some applications when used with a RAM disk. However, all of that depends on the percentage of 64 owners who buy the RAM expander.

Last year, Commodore introduced two RAM expander cartridges for the 128: the 1700, with 128K; and the 1750, with 512K. They're proving to be very popular, and the new expansion module for the 64 is also likely to attract a very positive reaction among users. (For more on the 128 RAM expanders, see "RAM Expansion for the 128" in the March issue.)

Is The Future 3½?

Commodore also recently announced a 3½-inch disk drive for the 64 and 128. The 1581 drive, priced at under $400, offers Commodore users not only more data storage capacity, but significantly faster disk access for 64 users.

For example, the 1541 disk drive is a single-sided, single-density device that can store up to 160K of information on one disk. The 1571 drive can be used in a double-sided mode that contains up to 320K of information on a disk.

But the new 3½-inch drives are double-density, double-sided media with a total capacity of 808K—five times the storage of a 1541 disk and 2½ times the storage of a 1571 double-sided disk. Obviously, a Commodore 64 with a RAM expansion module and a 1581 3½-inch disk drive becomes a much more powerful and versatile computer.

But will software manufacturers produce their programs for the 64 on a 3½-inch-disk format? In order for that to happen, the software developers must first see an installed base of 3½-inch disk drives that's large enough to allow them to make a profit. Building a base of 64 owners who use the new disk drive will take time, of course, so it's not likely that much 64 or 128 software will emerge on 3½-inch disks during the next few months.

In the long run, however, that could change. The new 3½-inch disks have become increasingly popular. They offer faster speeds, a more durable shell, and greater memory capacity. These small, rigid disks are used with the Amiga, the

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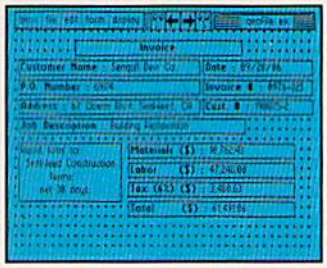

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The geoFile "form" organizes all kinds of information. Like names, numbers, rates of objects' acceleration when dropped from two-story buildings—you name it. As much as you can fit on a printed page.

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ST, the Macintosh, and with a host of portable computers. Apple Computer now offers a Unidisk 3½-inch drive for the Apple IIe, IIc, and IIGS computers. And IBM will reportedly be using the 3½-inch drives in its next generation of computers.

Quick-Loading The 1541

Long before Commodore introduced the latest data storage devices, other companies began providing alternative disk drives, including hard disks, as well as devices or software that speed up the access time between the 64 and the 1541.

Among the most popular and least expensive ways of speeding up the 1541 are the quick-load cartridges or programs available from several companies. These generally work by increasing the transfer rate of data between the 64 and the 1541.

Included in this list are the the 1541 Flash! hardware-based system ($99.95) from Skyles Electric Works (231E South Whisman Rd., Mountain View, CA 94041), the MACH-5 disk and cartridge-based system ($34.95) from Access Software (2561 South 1560 West, Woods Cross, UT 84087), and the Fast-Load cartridge ($39.95) from Epyx (P.O. Box 8020, 600 Galveston Dr., Redwood City, CA 94063). In addition, the July 1985 issue of GAZETTE offered two quick-load programs for the 64, *TurboTape* and *TurboDisk*.

There are two recently released speed-up systems for the 64, both of which require hardware modifications to the 1541 drive, the 64, or both: Professional 1541 DOS and DigiDos.

Professional DOS is a hardware/software combination that causes the 1541 drive to read entire tracks at once rather than just one sector of a track. Distributed in West Germany by Mikrotronic System, the system should have a U.S. distributor by the time you read this. The manufacturer claims that, depending on the file, the system should load between 35 and 50 times faster than a normal 1541 drive. Saving is supposed to be 10 to 20 times faster, and there are reportedly speed improvements in scratch, verify, and fast formatting.

DigiDos ($59.95, plus $3.50 shipping and handling), from DigiTek (10415 N. Florida Ave.. Suite 410, Tampa, FL 33612), is an operating system enhancement that speeds up all disk functions. The manufacturer claims that the product will load 39 blocks per second, compared to the normal 2 blocks per second on a normal 1541 drive. The DigiDos system also includes a realtime monitor, a DOS wedge, a variety of new utilities, and single-keystroke commands.

It should be noted that both Professional DOS and DigiDos require hardware modifications that may be beyond the technical abilities of some readers. These changes also would likely invalidate any warranties that apply to your 1541 drive or your 64.

The Real Powerhouses

For those who consider themselves power computer users, the data storage device of choice is usually a hard disk drive. Capable of storing *megabytes* (one megabyte equals 1024K, or approximately one million bytes) of information, hard drives offer both power and flexibility. A ten-megabyte hard drive can hold the equivalent of 60 1541 floppy disks.

A hard disk functions somewhat like a floppy, but operates at much higher speeds. The hard disk itself is usually seated permanently within a case, spinning much faster than a floppy. Rather than having a read/write head that actually touches the disk, as in the 1541 or 1571 drives, a hard drive's recording head floats just above the surface of the disk. Hard drives are much more sensitive to movement and to dust, but improvements over the past several years have left them much less prone to "head crashes" that can destroy data.

There are several manufacturers offering hard drives for the Commodore 64 and 128 computers. And, in general, the prices of these units have dropped considerably in just the past two years.

InConTrol (103 Baughman's Lane, Suite 301, Frederick, MD 21701) offers three versions of its Data Chief hard drive: the HFD-5, a 5-megabyte hard disk selling for $695; the HFD-10, a 10-meg system costing $895; and the HFD-20, a 20-meg hard drive that's available for $995. All three work with either the 64 or the 128, and support all of the DOS commands and wedge commands for both machines. They're *GEOS*-compatible and also contain a built-in floppy drive. The metal housing can hold up to three half-height hard disks, and is expandable.

JCT (P.O. Box 286, Grants Pass, OR 97526) also has three hard disk drives available for the 64 or 128: the JCT-1000, a 3.7-meg system for $595; the JCT-1005, a 5-meg drive for $695; and the JCT-1010, a 10-meg system for $795. JCT is also planning to have a 20-meg system available by midyear. The drives use standard Commodore commands, and include additional subdirectory commands. Data transfer is via the serial bus, and is reportedly 1.7 to 2 times faster than on a 1541. However, parallel transfer is also available with the drives for an additional $50, reportedly speeding up the transfer rate from 10 to 20 times faster than that of a 1541 drive.

Xetec (2804 Arnold Rd., Salina, KS 67401) offers a 20-megabyte drive, the Lt. Kernal, that's available for the 64 for $899 and for the 128 for approximately $950. This drive was originally to be released well over a year ago by Cardco, but because of financial problems at Cardco during that period the system is now being marketed by Xetec. The Lt. Kernal has 42 additional or enhanced system commands, and a reported disk-access speed more than 100 times faster than that of the 1541. There are also built-in backup and restore facilities. Xetec also plans to offer an optional four-computer multiplexer that will allow a maximum of 15 computers to operate together at one time.

Just a year ago, the one or two hard drives available for the 64 had prices in the $1,500 range. Now, with prices half that in some cases, 64 and 128 owners are likely to begin buying these systems in greater numbers.

It would have been difficult to imagine several years ago just how many data-storage options are now available for the 64 and 128. But as new and experienced Commodore owners continue to find out, their computers are among the most versatile and useful machines on the market.

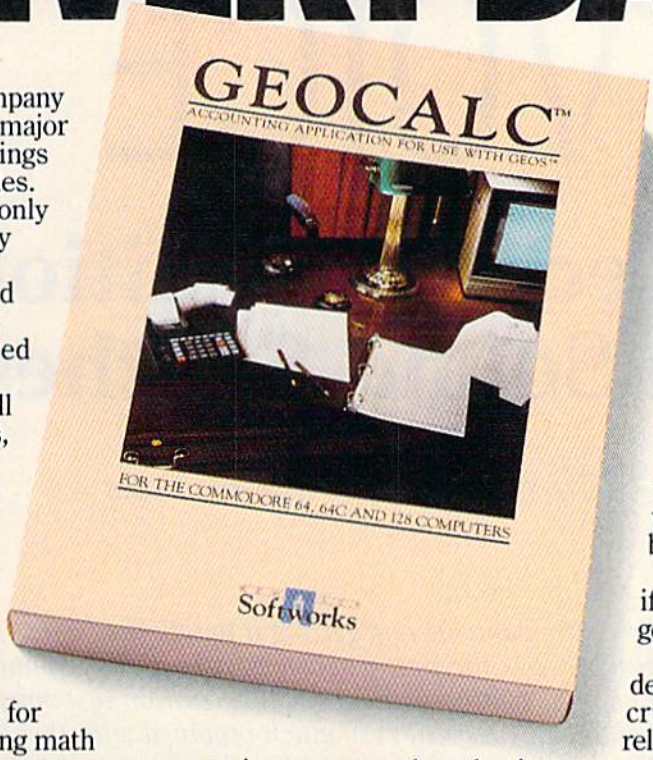
WE'RE SELLING THE ONE THING WE COUNT ON EVERY DAY.

Running a software company is no picnic. We have to do major calculations every day. Things like payables and receivables. Taxes. Budgets. And lord only knows how many quarterly cost projections.

That's why we developed geoCalc. The spreadsheet program for GEOS-equipped Commodores.

You see, we not only sell software for Commodores, we actually use them in our own offices. So when Lee needs to project inventory costs, or Brian wants to figure employee bonuses, the first thing they do is load up geoCalc.

The very same spreadsheet you can use at home for figuring finances, mastering math mysteries or personal production predictions.



	A	B	C	D
4	Operating Expense			
5		January	February	March
6	Raw Materials	11000	11750	10750
7	Manufacturing	15000	14500	14350
8	Rent	4000	4000	4000
9	Labor	28000	28000	21000
10	Utilities	3000	3150	3150
11	Transportation	8000	7800	8000
12	Overseas Shipping	4000	4500	4250
13				
14	Total	65000	65700	65450
15				
16	Grand Total		196150	

With geoCalc, you get 112 columns and 256 rows to fill with all kinds of text and numbers. And formulas that range from simple addition to arctangents and cosines that could knock any physicist cold.

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With mouse in hand, you can zip all over the huge spreadsheet, solving "what if" questions with a few quick clicks. Questions like, "If Sheila takes the waitress job, how much can we expect our taxes to increase?" Or "How much faster will the Chevy go if we rip out the muffler and the back seat?"

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THE DIGITAL VOICE

Speech Recognition And Sound Synthesis

Kathy Yakal, Assistant Features Editor

Talking to your Commodore 64 and getting it to talk back may be easier than you think. Over the past five years, a number of companies have marketed speech synthesis and voice recognition systems for the 64. And several of them are still very much involved with these products. Not only is this voice technology a fascinating step forward for computer users, it also has practical applications for people with special needs.

The concept of computers that can talk, listen, and respond has fascinated people for years. Hundreds of science fiction stories and books and dozens of movies and television programs have used the concept in many different ways: the monotones of Robbie the Robot in the classic *Forbidden Planet*, the soothing voice of the deadly HAL computer in *2001*, the *That-does-not-compute* responses of the eccentric robot in TV's "Lost in Space," the verbal barrages between R2D2 and C3PO in *Star Wars*, and even the female computer voice on the U.S.S. Enterprise in "Star Trek."

SID!

But in practical applications, speech synthesis and voice recognition have only recently begun to come into their own. The earliest personal computers that could produce sound were incapable of delivering any noises more sophisticated than the blips, beeps, and whistles that made up many of the first computer games. These computer games were graphics-intensive but sound-poor because of their limited memory and weak sound chips.

The auditory portion of most home computer software then consisted primarily of little snippets of sound effects added for emphasis or of background music repeated over and over again. But during the past two or three years, a variety of new software programs for the 64 have emerged that include sections of speech quite remarkable in its clarity and complexity. For example, many Commodore users may be familiar with the bloodcurdling scream or the taunting "Stay awhile, stay *forever!*" from the Epyx game *Impossible Mission* and with the weird laughter in both the arcade game *Gorf* and Activision's *Ghostbusters* program.

Software designers and peripheral manufacturers realized early on that the Commodore 64 boasts one of the most impressive sound chips designed for any home computer, the SID (Sound Interface Device) chip. Consequently, they began developing tools to maximize the SID chip's contribution to the usefulness and entertainment value of the 64.

The power of sound has added tremendous emotional impact to many computer games on the Commodore 64. Further, it has made the 64 a more valuable educational tool and has helped meet the specialized needs of handicapped computer owners. Though there are only a handful of companies actively involved in the manufacture of speech synthesizers, digitizers, and voice recognition devices, they continue to upgrade their products to make them both easier to use and compatible with a wider range of software.

Three Different Categories

Let's use three different categories to divide the way the human voice is used in microcomputer programs. Speech can be created for use either in commercial programs or by individuals for their own use through one of two processes: *digitizing* or *synthesizing*. Though digitizing offers more realistic-sounding speech, it also takes up more memory. Digitizing requires external hardware to actually encode the sound digitally, but can be played back in software without any hardware components. Speech synthesis usually requires external hardware and can produce an infinite number of words. (See "Making the 64 Talk," accompanying this article.)

A third area of speech technology is *voice recognition*, which is another form of digitizing. The user talks into a microphone, and the computer seems to understand the command spoken to it, performing some kind of preprogrammed function in response. It doesn't really understand the command. What it's doing is digitizing the words spoken and matching up the digital pattern to previously digitized commands.

The Covox Voice Master (shown here in its new case) is a speech digitizer with many educational, productivity, and entertainment applications.

Speech Construction Set, *when used in conjunction with the Covox Voice Master, is a powerful speech-editing tool.*

An Old Product With New Features

A number of companies have come and gone in the area of voice digitizing products for the 64. The Genesis Computer Corporation produced several products, including the ComVoice Voice System, now marketed through Votrax International. Tronix used to market a product called *SAM (Software Automatic Mouth)*, a disk-based speech synthesizer. Commodore itself released the Magic Voice speech module, a voice synthesizer that added limited speech to the games *Gorf* and *Wizard of Wor*.

Covox, a company that has marketed voice recognition and speech digitizing systems for several years, continues to offer products in this field. What has been the secret to their longevity? "We have a good product at a fair price," says company vice president Brad Stewart. "And we continue to support customers and come out with enhancements. The hardware has everything people need, and the software just keeps getting better."

The Covox Voice Master is a speech-digitization and -recognition module that plugs into a joystick port on the Commodore 64 and sells for under $90. The accompanying software gives it several capabilities. You can speak into the microphone, and the program will digitize and record your voice, saving it for later use. Up to 64 words or phrases can be recorded at once. Once recorded, words can be played back through software alone (without plugging in the module). The program's editor can alter the *amplitude* (breadth or range) of a word or phrase, which means you can actually improve on its original quality. The Voice Master system is also capable of word recognition; you can program it to understand what you say and respond in kind.

Voice Harp, included with the package, is a music composition program. Hum or whistle into the Voice Master's microphone, and musical notes matching the ones you're singing scroll by. Once you've composed a tune, you can go back and edit its harmony, tempo, and pitch, then print out the score.

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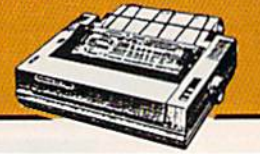

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Altering Your Prosody

Votrax, another company producing voice technology products for the 64, developed its early reputation primarily through high-end speech synthesizers manufactured for the professional market.

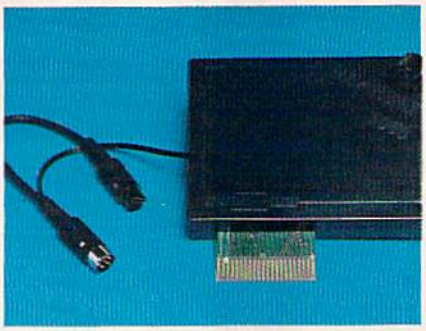
A couple of years ago, Votrax introduced its first consumer product, the Votalker cartridge for the Commodore 64. Selling for $99.95, the Votalker speech synthesizer fits into the expansion port and uses 8K of the computer's memory. Since it's a voice synthesizer, you must type in the words you want it to say, sometimes altering the spelling to avoid a mispronunciation. You can choose from among nine volume settings and four pitches; you can also vary the speed. This ability to vary so many parameters makes it possible to alter the voice *prosody*, the personality of one's speech. (For a review of the Votalker, see the June 1986 issue of GAZETTE.)

At about the same time that the Votalker was introduced, a British company, Welwyn Currah, released a speech synthesizer for the Commodore 64 called the Voice Messenger. Realizing that there was a great deal of interest in programs that already incorporated speech, Currah teamed with another company, Research in Speech Technology, which developed software compatible with the voice system. For the last year, those products have been marketed under the name Hearsay, Inc., and the product line continues to expand.

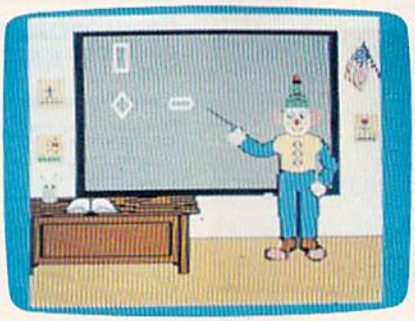
Now called the Hearsay 1000, the voice hardware is a combination speech synthesis/voice recognition peripheral. The module plugs into the Commodore 64's expansion slot and comes packaged with software that allows user-programmed speech. Suggested retail price is $79.95.

Steve Veltri, president of Hearsay, feels that voice synthesis and recognition is relatively new to the consumer marketplace in terms of real-life applications. Education, he believes, is one of the first and most important applications. After all, before a child can use the keyboard, he or she can talk and listen.

For this reason, Hearsay has developed a line of educational software to be used in tandem with the voice synthesizer. The first three titles in this Software for Children line are *Aqua's Circus*, *Rhyme and Reason*, and *Think Bank* ($29.95 each). Using colorful graphics and familiar characters, these programs help children learn verbal skills, coginitive development, vocabulary, and mathematical skills.



The Hearsay 1000 combines speech synthesis and voice recognition in one unit. The Commodore version comes with SwiftLoad *(for fast loading), and retails for $79.95.*



Aqua's Circus *is one of the first titles in Hearsay's line of educational software developed to support the Hearsay 1000. Each program in the series retails for $29.95.*

Beyond that, says Veltri, these voice-driven programs give children an early sense of accomplishment, one that normally isn't achieved until a child can actually read and write.

The Hearsay 1000 also works with many third-party programs from major software publishers like Infocom, Epyx, CBS Interactive Learning, and Batteries Included. In fact, any text-based programs should be compatible, allowing you to issue verbal commands instead of keyboard entry. For example, if you were playing the all-text adventure *Zork*, the Hearsay 1000 would read a line to you, and you would speak the command back rather than typing it in. Since no speaker is necessary on the Commodore 64 unit, you can just sit in your chair and issue commands.

Helping The Handicapped

A third use for voice recognition and synthesis is providing alternatives for handicapped individuals, says Veltri. Keyboard entry—including cursor control—can be done verbally instead of manually, making computer use feasible for visually and physically disabled persons.

For people with hearing disorders who want visual feedback about their voice pitch (where and when it goes up and down), Covox's new *Speech Construction Set* may be of help. This program does for voice what drawing and painting programs do for creating pictures. Using the software's split screens and high-resolution graphics, you can manipulate and track speech patterns in a variety of ways. The suggested retail price is $39.95.

For more information about how microcomputer technology is being used to help the handicapped, contact Closing the Gap, P.O. Box 68, Henderson, MN 56044. This group offers a monthly newsletter, and the publishers also sponsor an annual conference.

Hey, You!

If you've walked through a computer game arcade recently, you've probably heard all kinds of machines challenging you to step up and play. Like pitchmen at a carnival, today's computer games often try to lure you into playing by verbally taunting and teasing you. Graphics and action may keep you interested in a game, but sound—especially the latest electronic verbal gymnastics—rope you in.

The current developments in the field of voice technology are indicative of what's happening in the microcomputer industry at large. Voice creation technology is constantly being refined as consumer need and acceptance are gauged, then incorporated into every level of consumer electronics technology. Applications extend from the home to the workplace, including our biggest industries. Talking

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Making The 64 Talk

Todd Heimarck, Assistant Editor

There are two ways to make a computer speak: digitizing and synthesizing. Each approach has advantages and disadvantages.

A speech digitizer is like a tape recorder. It has a microphone and electronic circuits that transform the continuous (analog) sounds into discrete (digital) numbers. If you speak a word or phrase into the microphone, the digitizer converts your voice into a series of numbers that represent the frequencies and volume of your words.

The numbers are then stored in memory or saved to disk. To replay the digitized sounds, you use a driver program that reads through the numbers and feeds the appropriate values to the sound chip in your computer.

Speech synthesizers, on the other hand, string together a series of *phonemes* to form words. A phoneme is the smallest meaningful sound in a language. In English, for example, *bat* and *pat* are considered separate words, because the sounds represented by *b* and *p* are separate phonemes. There's a loose connection between spelling and sounds, but two letters such as *th* are pronounced as a single phoneme, and the single letter *x* is two phonemes (a *k* sound and an *s*). Speech synthesizers don't use a microphone. Instead, you usually type in the words to be spoken, and the program *concatenates*, or links together, the individual sounds. Some speech synthesizers require phonetic spellings; others understand some of the quirks of English (*tough* and *though* are spelled similarly but pronounced in different ways, for example).

Stay Awhile, Stay Forever

When you hear a very realistic voice in a commercial game, what you're hearing has almost certainly been digitized by a service that specializes in creating sounds for software companies. They use sophisticated computer systems to record and dissect the phrases for a game. For Epyx's game *Impossible Mission*, someone sat down with a microphone and spoke the words *Stay awhile, stay forever*. The words were then analyzed down to a series of individual sounds that could be played back through the 64's SID chip.

The most attractive feature of digitizing is the high-quality speech. It sounds as if someone is really talking (or laughing or screaming) because it's essentially a recording of a real person's voice.

A second advantage is that once a sound has been digitized, it can be played back without external hardware (although you do need a 64 with a working SID chip). The voice can be generated entirely through software. If you're writing games to be sold or distributed, this means you can add digitized voices or sound effects to your product without requiring your customers to purchase any additional hardware. Of course, you need hardware to digitize the original sounds, microwave ovens, dishwashers, cars, and telephones are bringing science fiction closer to science fact.

Home control is one area where voice technology will almost certainly be accepted, and many companies are developing products toward that end. Covox will introduce James, The Electronic Butler, a marriage of its own Voice Master module and the X-10 Home Control System which allows simple voice-activated control of home appliances.

Covox is also working in another area that is meeting with some acceptance: low-cost talking software. "The Commodore 64 is still the best machine going for that kind of program," says Covox's Stewart. Using colorful graphics within an interactive format, these Covox educational tools are expected to be available by summer of 1987.

Talking Teacher is the first educational product released by Firebird Licensees, a U.S. distributor for a line of British software that has met with strong approval in its first 18 months here. It also employs a graphics-intensive interactive environment enhanced by speech digitizing.

The speech for *Talking Teacher* was created for Firebird by Electronic Speech Systems, a company that's done a great deal of speech production work for many companies in the toy, automotive, and military fields. ESS has also been known for several years in the microcomputer game world. For example, it was ESS that put the digitized speech in *Impossible Mission* and the eerie laughter in *Ghostbusters*, among other game titles.

Just as you can create speech for your own computer programs using inexpensive tools at home, commercial software publishers have the resources to do the same. But the trend in software development these days is to give over specialized elements of program design to experts, like bringing in professional artists to draw graphics, musicians to compose music, and authorities in many fields to lend expertise on program content. ESS uses its own computers, recording studio, and audio engineers, resulting in better compressed, more finely-tuned speech for programs.

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but after they have been turned into numbers, the digitizing hardware is no longer needed.

A serious drawback of digitized speech is that you can play back only the sounds you recorded. Digitizing is like taping a song from the radio. You can't, for example, record a rock song and turn it into a bluegrass melody. The Commodore Magic Voice Module—which has been discontinued—used digitized speech. It had roughly 200 words in ROM—that was it. If you wanted to hear one of the built-in words, it would pronounce it. If you wanted to hear anything else, you were out of luck. It only knew the words that were digitized.

A second problem with digitizing is that it eats up memory. If you've been in a record store lately, you've probably seen one of the new compact discs (CDs). All of the music on the discs is recorded digitally, and each CD holds 550 megabytes, more than half a gigabyte. To put it another way, the amount of information that fits on one CD would require roughly 4000 disks formatted on a 1541. The memory of a 64 would hold less than a second's worth of music from a compact disc.

The music on a CD is originally sampled 44,000 times per second. Speech digitizers have a sampling rate that's much slower (which is one way to save memory). But as the sampling rate gets lower, the quality begins to suffer. At a minimal acceptable level, you might be able to fit ten seconds or so into the available memory of the 64. Unless you have large amounts of memory, digitized speech is a compromise between quality and quantity.

Speech Synthesizers

There are two examples of synthesized speech you may be familiar with. One is in the movie *War Games*, which included a brief role for a speech synthesizer which said "Shall. We. Play. A. Game?" The other you may have heard if you've visited a computer store recently, or know someone who owns an Amiga, which has a software speech synthesizer.

Here's how speech synthesizers are constructed: If you recorded 100 people pronouncing a variety of words containing the *v* sound, then analyzed the characteristics of *v* with an oscilloscope, you could separate the individual components of the average *v* sound and thus reproduce the *v* sound with oscillators or a computer's sound chip. Repeat this process for all the sounds of the language and you'll end up with a speech synthesizer. Each sound is put together (synthesized) as it is output. The phonemes act as building blocks that can be combined to make words and sentences.

Most synthesizers for the 64, including the ones made by Votrax and Currah, are sold as hardware cartridges that plug into the back of the 64. They may have a separate speaker on the cartridge or may include a cord that diverts the sound through the speaker of your TV or monitor. There once was a speech synthesizer for the 64 that worked in software (*Software Automatic Mouth*, or *SAM*), but it's no longer available.

The most attractive feature of speech synthesis is that it gives you an infinite number of words. With a limited number of phonemes—usually 64—you can build any word in the English language. Digitizers can play back only what they've recorded, but synthesizers can say anything.

Speech synthesizers have a second advantage: They don't require a lot of memory. For a digitizer to record someone saying the word *phone* might require thousands of bytes. But all a speech synthesizer needs to know is that it should pronounce the *f* sound, the *oh* sound, and an *n*. Three sounds—three bytes of memory.

As you might have guessed, speech synthesizers have some shortcomings. For example, the quality of synthesized speech is not as good as that of digitized speech. Synthesizers often sound unexpressive and "computery" (think of the voice from *War Games*). Some synthesized speech has a sort of Scandinavian accent.

And finally, if the synthesizer is in hardware, you can add speech to your own programs, but other people can't use your program unless they also own a speech synthesizer.

A Combination Of Input Devices

Voice recognition is probably the most familiar existing method of getting information into a computer. We're all used to talking to other people, having them hear and process what we say, then having them respond.

But voice recognition may not be the most appropriate method in all settings. Using a Covox product in conjunction with a word processor like *SpeedScript*, it's possible to avoid entering all of the formatting commands, saving time and keystrokes. That's fine when you're sitting in your own private office or workroom at home. But imagine the chaos that it would create in an open office—five or six different people each trying to have their commands heard over the commands being issued by the others.

Covox's Brad Stewart believes that we're heading toward a combination of input devices, each of which—whether mouse, joystick, keyboard, or light pen—is used where most appropriate. And voice technology still has a long way to go. "Technology for speech recognition is not at a point where you can rattle off a sentence and have the computer figure it out," he says.

But voice technology has come a long way. "After all," says Stewart, "Who would have imagined that today we'd have *GEOS* or voice recognition or sophisticated speech synthesis on the Commodore 64?"

For more information on any of the products mentioned here, contact:

Covox
675-D Conger St.
Eugene, OR 97402

Electronic Speech Systems
3216 Scott Blvd.
Santa Clara, CA 95054
(For a telephone demonstration of the speech quality of ESS products, call 415-644-8127.)

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Operation Terminal

Operation Terminal by Dreamrider Software is a breakthrough in personal computer software. It's advertised as—and, as far as I can tell, is—the first commercially available modem game with full graphics capabilities. While this Commodore 64 program can be played by one, it's designed to be played by two users at remote locations over their telephone lines. The program adds a new level of excitement to the booming world of home telecommunications.

The program casts its players as spies from competing countries on a secret mission to save the world. On an island in an unknown location lies a mysterious research facility known as the Antimatter Complex, built by an unidentified scientific genius. The research at the complex involves using antimatter as the ultimate energy source. However, antimatter is also the most destructive explosive material known to man. Obviously, your country is very concerned about who gets hold of this research and to what use it's applied.

That's where your character comes in. As one of the nation's top operatives, you must parachute onto the island, retrieve certain research documents and pieces of antimatter, and escape the island. All this must be accomplished within 30 minutes. The only means of escape from the island is a device called the Particle Degenerator, which will convert you into light waves and transmit you off the island.

Your mission has become even more imperative since the scientific genius who built the complex disappeared under mysterious circumstances just before turning over the results of the antimatter research to your country.

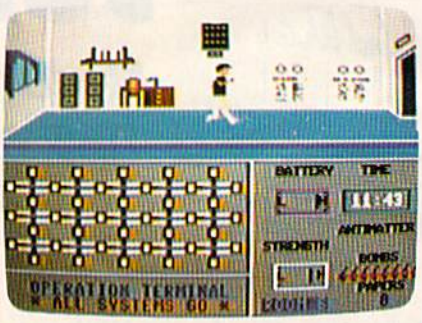
The complex is a series of rooms which form a matrix and are joined by hallways. Each room has a wall compartment that may contain a piece of antimatter or one of the documents you are looking for. You do not know which rooms contain the items and, therefore, must conduct a search of each room until you find the required amount of antimatter and documents. Beware, however, for there are booby-trapped rooms that set off bombs by an electronic signal triggered when a door is opened. If you guess wrong and enter a booby-trapped room, the bomb will explode and disable you for about 15 seconds, costing you valuable time and depleting your strength.

To counteract the bombs, you have been equipped with a device that jams the electronic signaling device. The device's power source is a battery that can be depleted, but is rechargeable in one of the complex's rooms known as the Battery Room. Conservation of that power is important to your success, however, since recharging takes time.

Operation Terminal...*adds a new level of excitement to the booming world of home telecommunications.*

The top half of the screen layout provides you with a view of the hallway or the room your character is presently in. When your character is in a hallway, the view is from the ceiling down, and when in a room, a more conventional side view is shown. The bottom half of the screen has a map of the complex's room matrix and shows you where your character is in the building. Several gauges showing time, battery level, strength, and the number of items collected also appear at the bottom of the screen. While movement of the character is by joystick (required for game play), several keys control actions, such as activating the jamming device.

To succeed at *Operation Terminal*, you'll have to use simple but effective strategy, as you must race against the clock to collect the needed items. You must guess which rooms are booby-trapped to conserve battery power in your jamming device, or you will use too much time recharging (or getting disabled by bombs). Your strength can be depleted by opening wall compartments in your search for the items you must collect and, of course, by triggering bombs. If your strength gets too low, you cannot open the wall compartments. Once strength is tapped, you must find the First Aid Room (another special room in the complex) and renew your strength before you can proceed with the mission. Again, having to divert your attention to matters other than collecting the required items will waste precious time. To compound the difficulty of your mission, an enemy agent (the other player) will be attempting the identical operation at the same time. You must complete your mission and at the same time prevent the enemy agent from succeeding with his or hers.



Operation Terminal *is a one- or two-player modem game featuring color graphics.*

The real strategy comes into play with respect to your opponent. No matter how successful you are with your mission, the other player may be capable of beating you. Enough items exist in the rooms to allow both players to meet their requirements. Once one player has collected his or her items and has escaped the island through the Particle Degenerator, the other player's mission timer drops to one minute. The remaining player then has only one minute to both complete the mission and leave the island.

The program offers several tools to help you combat your opponent. One is radar mode, which allows you to spy on your opponent. While in radar mode, your screen shows the location and vital information about your opponent. Further, you are armed with several bombs (as is your opponent) that you can place in any of the rooms to slow your opponent down. The bombs also

can be used to destroy the Battery Room and prevent the recharging of the jamming devices. However, destruction of the Battery Room can backfire on you, since neither player can recharge their jamming device once the Battery Room is destroyed.

As noted earlier, one player can use *Operation Terminal*. In the one-player version, your only enemy is the clock, as you must complete your mission within 15 minutes. The one-player game doesn't require a modem. However, this version suffers from a lack of competitive strategy that the two-player version offers. This criticism is, of course, true of any game offering one- and two-player versions. Frankly, the main utility of the one-player version is that it provides practice for the two-player mode.

The program works with all the Commodore modems and with many other popular brands. The terminal program is incorporated within *Operation Terminal* and is extremely easy to use. In fact, all the instructions you need are displayed on the screen. Either player may initiate the modem connection. At any time during play, either player may send a message to the other and enter into a message mode until one of the players breaks it off. While in the message mode, the timer on the game stops running.

Operation Terminal is a good game, with a simple but interesting plot and enough strategy to keep you involved in the game. The reason to buy it, however, will probably stem from your interest in playing against someone else via the modem. If you have a modem and a friend with one, and you are not able to get together as often as you'd like to play computer games, *Operation Terminal* may just be what you're looking for.

[The manufacturer reportedly offers a bulletin board service that lists the names and players of *Operation Terminal* in your area. —Ed.]

—*Scott Thomas*

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Crete, IL 60417
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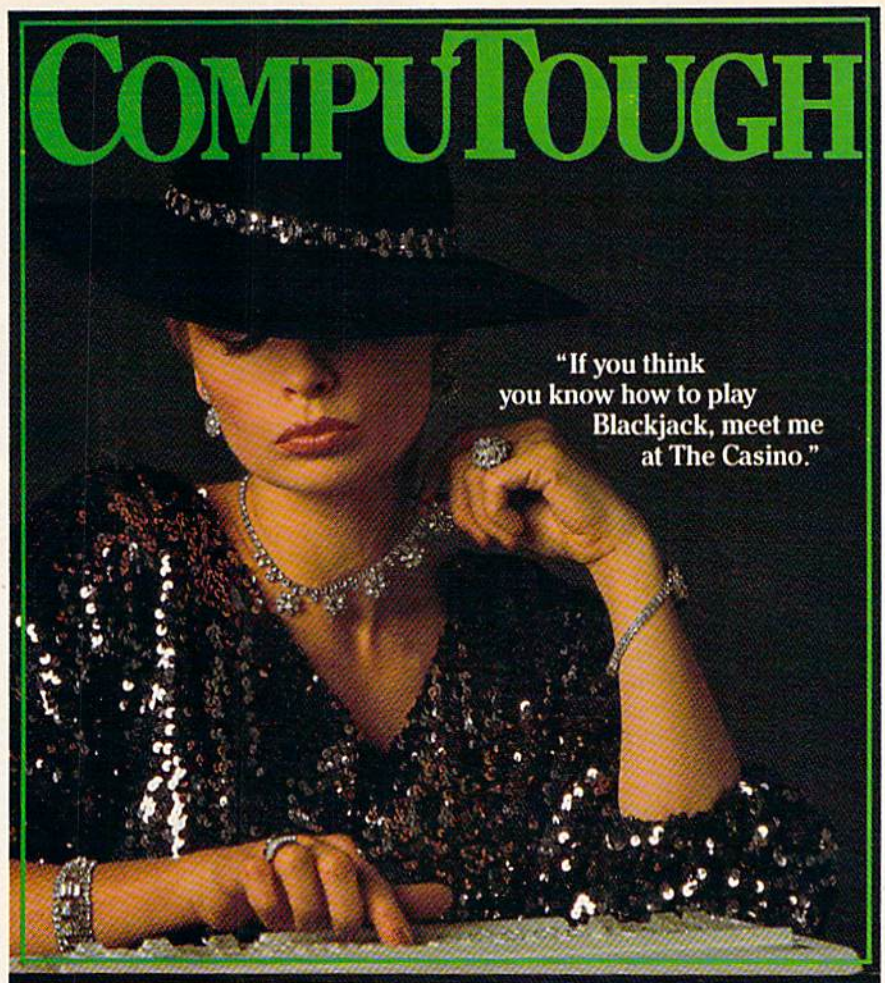

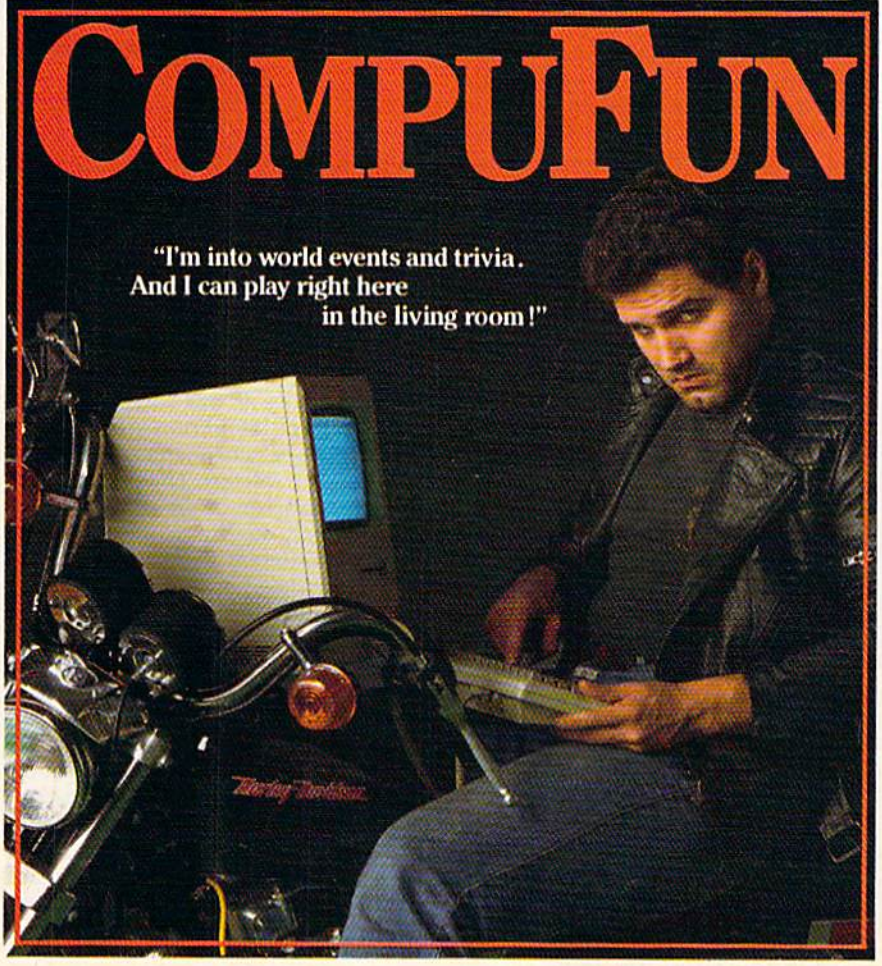

Thinking Cap

Late last year, I read an article about a new *outline processor*: computer software that can assist you in creating outlines for projects like school and work reports, books, and magazine articles. My own outlines tend to be informal, and I don't always use them. But the idea of being able to brainstorm and jot down notes at the computer tantalized me. Then I saw the price tag—$450. So I put the article away and dreamed of the day some creative individual would come up with an affordable variation for the Commodore 64.

In December, I said to myself: *I just have to get that book outlined! I'll never be able to submit it if I don't!* The prospect was daunting. Outlining a 20-chapter book is less than thrilling at best, and frightening when you know an editor's decision depends on how lucidly you describe your plot. Then, just before Christmas, I received a copy of *Thinking Cap* by Brøderbund.

Thinking Cap is described as an *outline processor*, or idea processor. You begin in a section of the program called Brainstorm, jotting down ideas as they come to you. You need only have a general idea of what topic areas belong together, because in Brainstorm you can change things around as you go along, making corrections and rearranging subtopics as the thoughts hit you.

You only need a title and your first idea. Through the use of highlighting and windows, you create an outline of up to 16 topics and to a depth of seven levels. The title is level 1; the first major topic is level 2; the first subtopic under a major topic is level 3, and so on. You can work in any order, because you can always open up a window to enter new items under a topic.

When you've gone as far as your creativity will carry you, it's time to review your work. This is done in the Overview section. Here, you view your outline in its entirety, to whatever depth you choose, so that you can see how you are progressing. This means you may view as little as the title, or all of what you've written, or anything in between.

The editing feature is available in Overview, too. This lets you modify your outline, fixing and rearranging text to meet your standards. There are screen prompts to help with some of the more complex moves. A pop-up window lists the editing functions. This window also keeps track of how much memory you have left.

Two editing devices, the Section Safe and Text Safe, are used to store portions of text that you cut away so you can paste them in elsewhere, either to move them or to make copies of a section or block of text. The Section Safe stores a topic, subtopic, or entire section of the outline. The Text Safe stores a block of text from a single topic or subtopic. Other features include Search-and-Replace and the ability to delete entire phrases.

Outlines or sections can be saved to disk. Outlines saved separately can be merged onscreen and printed out together. Sections saved separately can be formed into one coherent outline and resaved as such. A utilities section contains options to format a disk, view the directory, and delete or rename files.

The printing capability of *Thinking Cap* is one of its best features. You can customize to your own preferences and design, whether you're a speech maker, scientist, scholar, or scribe. Two menus handle most of the customizing. An option called Print Enhancements has nine items which may be varied: such things as title and headline emphasis, type of outline (Roman, technical, prose, numbered), title positioning, and so on.

In Thinking Cap, *you concentrate only on your ideas. The program takes care of the mechanics.*

Page Layout has eight page-manipulation variables to work with, similar to the choices offered by most word processor page layouts. A third factor influencing printout is what you display on the screen. When you're using the Hidden Text command, your screen display will show only the first line of each topic or subtopic, replacing the remaining text with an ellipsis. It would be nice if this capability were also a part of the printing function, so you could see where the missing text lay in your hardcopy. That, however, is my only criticism of the program.

You can modify your printout by selecting different depths, thus eliminating the detail of subtopics. You can also suppress any numbering in the outline. There are an impressive number of options offered in these variables, although most users will probably make two or three their favorites, depending on their needs.

What is all the excitement about? Why not just use a word processor and create your own outline? It's a little difficult to describe to someone who hasn't used it, but it's rather like the difference between typing and having a word processor. Think for a minute how long it would take you to center a title on a page with an ordinary typewriter. You need to know your pitch, your paper width, your margins, and the number of letters in the title. You need to calculate where center is; what half the number of letters and spaces in the title is; and what the center point, minus the latter number, is. Then you have to position your paper there. (Or you can go to center, read off the letters and spaces in your title, and backspace for every two.) With a word processor, you merely turn on your centering option.

In *Thinking Cap*, you concentrate only on your ideas. The program takes care of the mechanics. In writing an outline by hand, I get caught up in thoughts about the outline itself, and I can't think clearly about my topic. I also find myself doodling in the margins.

But in the Brainstorm section of *Thinking Cap*, I worry only about my ideas. I know I can go back and edit and move topics around after I have recorded all my thoughts. In Overview I can scan the outline to catch what changes need to be made. For printing, much like a word processor, *Thinking Cap* allows me to format the output to my liking—only here it formats in outline form rather than manuscript. Basically, *Thinking Cap* leaves my mind clear to work on the topic, then worry about the niceties of presentation *after* the real work is all done.

There are more nice features in *Thinking Cap*. There is a clear and helpful manual. There is an option to customize various areas (type of printer, screen color combinations, and others), so that when you load the disk, the program defaults to certain choices. You can use a variety of printers, and adjust for an unusual printer and for different interfaces as well. Finally, *Thinking Cap* accomplishes all of its wizardry through the use of windows. This distinctive approach is a large part of what makes the program so impressive.

I haven't stopped using *Thinking Cap* since I got it. In two days I outlined the half of my book that was already written, plus the next quarter, which was not. I completed the first version of the outline for this article, too. The program is stimulating, versatile, easy to learn, and easy to use. And the price is reasonable—which means that *Thinking Cap* is a good value. It does everything described in the article I read (about the $450 program) smoothly and satisfactorily. And although this is the first outline processor I've tried, I feel no need to look further.

—Robin Minnick

Brøderbund Software
17 Paul Dr.
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$49.95

Portal

This product, for the Commodore 64, is a computer novel different from any other computer novel on the market. Barely interactive and completely joystick-controlled, *Portal* is closer than any software yet produced to the experience of sitting back and reading a novel.

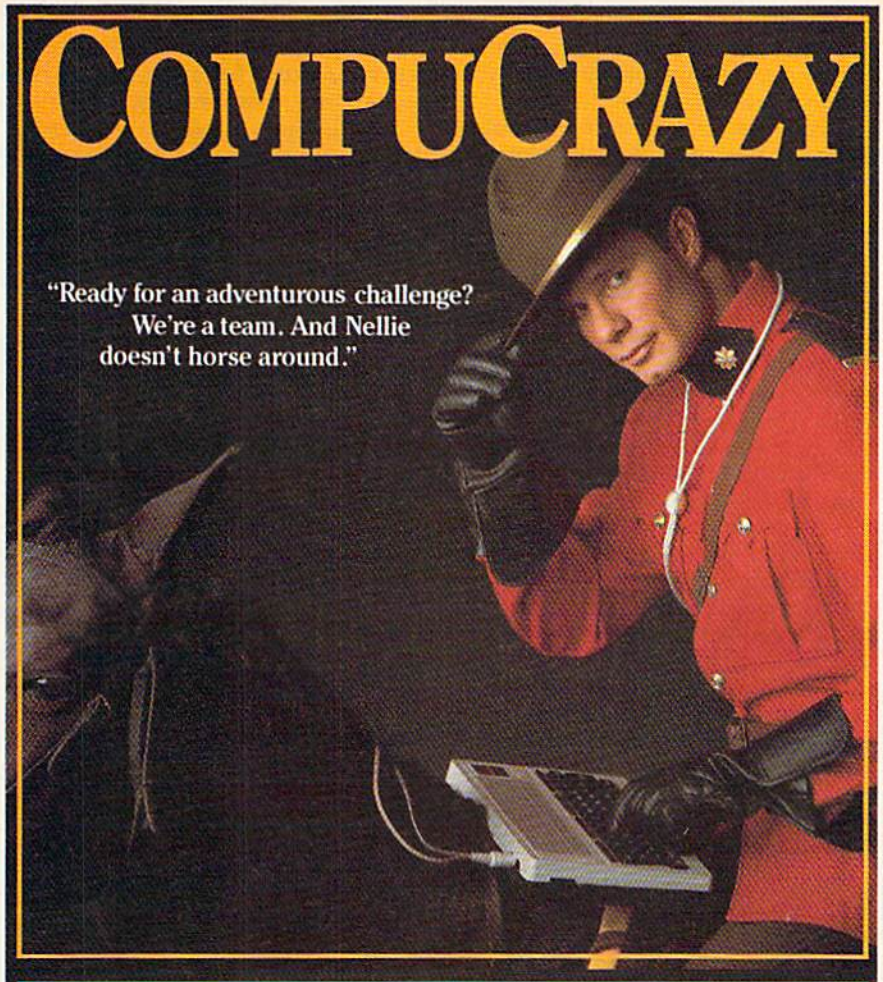
Portal places you in the twenty-second century. As the five-page printed prologue explains, you are returning to earth from a failed space mission, but things at home are not quite right. To be more specific, the planet has no people on it. But there's been no nuclear holocaust, and nowhere are there signs of widespread disease. Instead, the human race has simply disappeared.

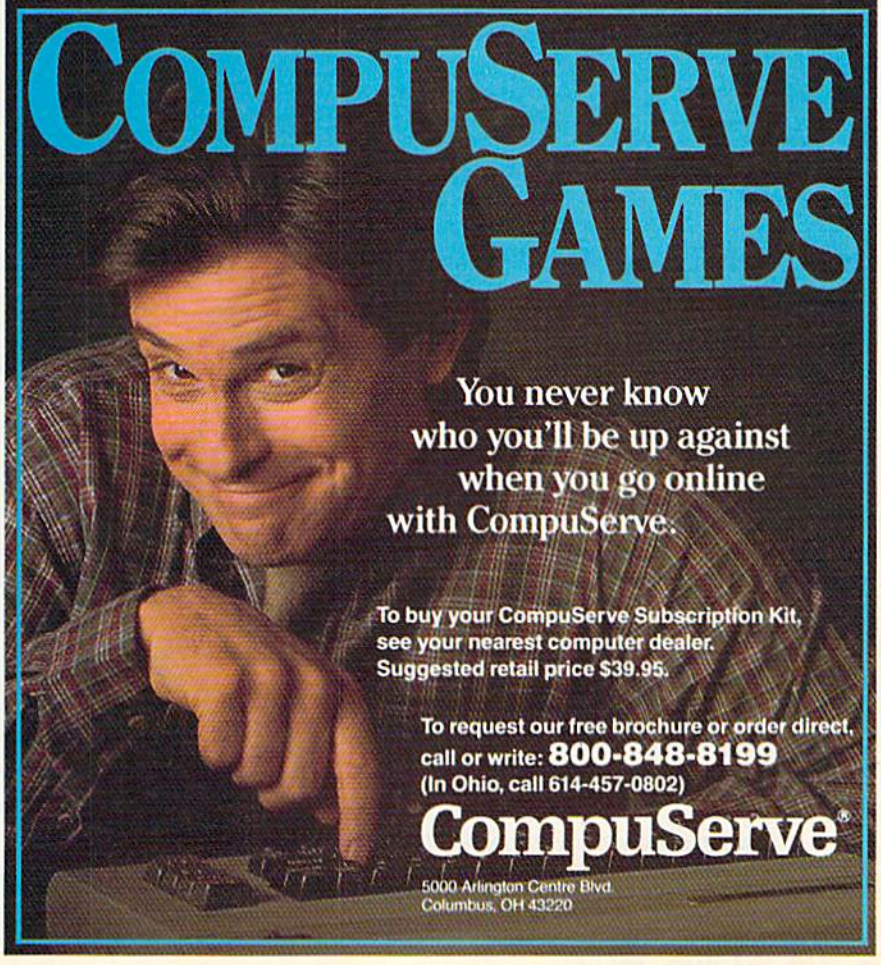
Your only link to the past, and thus your only chance of discovering what happened, is a Worldnet computer terminal. Beside the terminal you have found a set of operating instructions (included in the package) with only minimally helpful information. That's it. Somehow, you must try to find out where humanity has gone.

Portal's display is a series of 12 boxes, each with its own graphics design. The boxes represent databases within the Worldnet computer. These databases (or *dataspaces*, as they are called) contain whatever information Worldnet has on the events and characters within the game. For example, the Psychology, Life Support, Wasatch, and Edmod dataspaces contain data about each character that appears in the story, while the Military, SciTech, PsiLink, Geography, History, and Med10 dataspaces store scientific, technological, social, and historical knowledge. The most important of the dataspaces are Central Processing, which offers vital information not found in the other dataspaces, and Homer, the story's narrator.

Homer is Worldnet's "storytelling artificial intelligence." What this means, from your point of view, is that Homer is the dataspace that will recount the tale of what has happened to the human race. As the story progresses, Homer requires information from all the other dataspaces, in order to construct the story of the Portal. Your task in the game is to search through the other 11 dataspaces to retrieve the information for him.

To get this data, all you do is move from dataspace to dataspace (via joystick), entering each dataspace, and reading what has been stored there. After doing so, you return to the Homer dataspace and read the files Homer has created as a result of your searching. These files reveal Homer's story and, just as importantly, his concerns as storyteller. Throughout the story, Homer interrupts the narration to reveal his

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doubts about his storytelling abilities, his concerns about humanity, and the nature of truth in fiction.

Portal is, in fact, as much about Homer as it is about Peter Devore, the leader of humanity's Migration. Through a complex and often bizarre plot, one that begins with a simple technological error, Peter Devore enters the wrong dataspace and discovers things he should never be allowed to know. Among these is knowledge of the personality of Wanda Sixlove, a passenger aboard a space ship light years from earth. Through a series of mindlinks, Peter and Wanda fall in love with each other, and Peter spends the next several years trying to find a way to be with her. Somehow, in a way you must discover, that search is bound up with the disappearance of the human race.

The story itself is very good. Extremely well-written, with an intriguing plot, *Portal* offers some of the first truly excellent fictional passages seen on a computer to date. Reading Homer's narrative is a pleasure: The characters are fairly complex and highly believable, and the plots and sub-plots are well-managed. Homer does not tell us everything—what he leaves out we easily fill in for ourselves—but what he does tell is fascinating from start to finish. And the most interesting part of all, the feature that sets *Portal* aside from all other interactive fiction, is that we can see precisely how the story unfolds.

When done properly, interactive fiction makes us feel as if we are contributing to the story. Unlike books, which contain a story that we simply accept from one page to the next, interactive fiction demands that we participate in the creation of the plot. Also unlike books, we never know when the story will end. In interactive fiction, there is no last page.

Extremely well-written, with an intriguing plot, Portal *offers some of the first truly excellent fictional passages seen on a computer to date.*

To reach the conclusion of most adventure games, we must take the role of a character in the story and, by wandering around, talking to other characters, and solving puzzles, force the story towards its conclusion. In one way, such participation is satisfying, because we are allowed to directly influence the plot's outcome, but for those who like reading books, the sheer length of the adventure can be frustrating. *Portal* solves this problem in two ways. First, you are not part of the story of the Migration. Second, you don't really change the course of the plot.

In *Portal*, your only function is to get Homer the information he needs to tell the story. Then, for the most part at least, you sit back and read. As simple as this sounds, though, your actions in the game—going from dataspace to dataspace—are the game itself. You are not a character in the story, but instead you are watching the process of the telling of the story. Each piece of information you dig up is necessary to Homer's narrative; once you have found the information, you return to Homer and discover how he has put it into the story. In other words, you watch the story write itself.

Those expecting a graphics-and-text adventure along the lines of *Tass Times in Tonetown* will perhaps not appreciate the lack of direct participation in the plot, while those who want a graphics adventure such as *Ultima IV* will not enjoy the absence of role playing or the short duration of *Portal*. *Portal* can be completed in about the same length of time it takes to read a fairly long novel. Like all adventures, it is of limited usefulness after its completion, but unlike most, it can be reread with enjoyment.

Still, I recommend *Portal* with some reservation. If you want to see what can be done with a computer story, by all means pick it up. If you want a lengthy adventure with elements of role play, however, don't. *Portal*'s strength is its realization that text adventures don't really take the place of a good novel. It bills itself as a computer novel, and that is precisely what it is. Perhaps a little expensive for a novel, *Portal* offers a reading experience that is unique in computerized fiction.

—Neil Randall

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Gunship

Helicopters are playing an increasingly important role in modern military tactics. The U.S. Army is beginning to fly what may prove to be the most technologically advanced aircraft to date—the Apache helicopter gunship, a flying arsenal. Equipped with laser-guided Hellfire missles, a 30mm cannon (which is controlled by helmet gunsights), clusters of unguided rockets, and even Sidewinder missiles for air-to-air combat, this awesome craft is more than a match for most situations.

With *Gunship*, MicroProse Software puts you at the controls of an AH-64A Apache, America's most advanced helicopter, and gives you the chance to fly any of a number of missions. *Gunship*, for the Commodore 64, is a very well-executed simulation, not just a game. Real pilots "fly" missions in sophisticated simulators which utilize extremely powerful computers with dazzling graphics and realistic sound. These simulators permit pilots to experience aerial emergencies and combat situations without real risk. Obviously, the graphics capabilities of your 64 are no match for these simulators, but you'll see much more than simple stick figures with *Gunship*. For example, the three-dimensional graphics increase the sense of motion as you fly. All in all, the graphics are among the best I've seen for any flight simulation on an eight-bit computer.

As in real life, you should not expect to jump into this Apache helicopter and fly off into combat without some preparation. Read the manual carefully, then start out by taking flight training. Become familiar with the controls by flying a number of practice missions. Then head into combat in Southeast Asia, Central America, the Middle East, or—the ultimate test for any pilot—the USSR and its Warsaw Pact allies.

Even flying training missions has some risk. You'll make a lot of mistakes as you work to master the use of your weapons systems and on-board avionics. Take your time and learn well. You'll need the training later. Soon you'll be skimming the treetops at 200 mph as you wait for your AGM-114A Hellfire missile to lock onto target. The effect of firing the 30mm cannon is so realistic that you'll notice a slight loss in speed as you fire, due to the recoil of the weapon.

Another realistic aspect of the simulation occurs when you trim the gunship to maintain a constant altitude as you fire. In fact, you'll have your hands full just controlling the helicopter at first, not to mention dodging the surface-to-air missiles (SAM) and the enemy choppers in the area.

There are 29 optional settings for arming your weapons and flying the gunship, and it's tough to remember which keys control them all. Fortunately, *Gunship* makes it a lot easier by providing a keyboard overlay with labels for all the keyboard controls.

As the simulation begins, you'll need the manual, which is excellent and provides much information for the novice pilot. As an indirect form of copy protection, you're shown a drawing of a piece of military equipment on the screen and are asked to identify it from the manual. That's not difficult, but it does take a minute or so to look it up. Personally, I don't mind this form of copy protection. Just remember that you need the manual to run the program.

...MicroProse...puts you at the controls of...America's most advanced helicopter, and gives you the chance to fly any of a number of missions.

Gunship*...is a very well-executed simulation, not just a game.*

After the copy protection check, you're shown a summary of the last mission flown. Now is the time to change any statistics to make the upcoming flight easier or to increase its overall difficulty. The more dangerous the mission, the greater the score you can achieve. Flying difficult missions also leads to faster promotion and more honor, but it also increases your chances to be listed as KIA (Killed In Action) on the pilot roster.

You'll step through several screens, selecting a difficulty level then finally receiving your preflight briefing. You'll probably want to check the map while you're here. It's always a good idea to know where any friends might be located. After all, you don't want to hit them by mistake. And if you're hit, you might need a location near them for an emergency landing.

Finally, you're settled into your chopper, gazing at the control panel display. Glancing at the bottom of the screen, you see fuel levels, warning lights and gauges, a compass, and other pertinent items. It's best to become somewhat familiar with the locations of these gauges before firing up. Once airborne, things happen quickly. Check your weapons display and notice how many of each type of armament you're carrying. Take note of the location of the Threat display in the lower left corner of the screen.

A view from the cockpit in MicroProse's Gunship.

The development of *Gunship* was a long and complex project for MicroProse. In fact, an earlier version of this helicopter simulation was reportedly sent back to the drawing boards when the finished product didn't measure up to the expectations of company president William Stealey and MicroProse designer Sid Meier. After almost a year, the present version was released.

Was the wait worth it? Very simply, yes. In the tradition of *Solo Flight*, *F-15 Strike Eagle*, *AcroJet*, and *Silent Service*, MicroProse has another winner.

—George Miller

Gunship: The Helicopter Flight Simulation
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All programs listed in this magazine are available on the GAZETTE Disk. Details elsewhere in this issue.

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The next question is: "Which modem is best for me?" Let me first say that almost all modems (and services) are set up to communicate in one of two speeds; 300 and 1200 Baud. If you look around you will find that there is a flood of 300 baud modems on the market and sometimes at very low prices. The reason is simple, they are being dumped because most computer users prefer 1200 Baud. (1200 Baud is about 4 times as fast which means you spend less time and money getting the data you want and more time enjoying it.) Virtually everyone who has a 300 would rather have a 1200. You will also notice a few very cheap 1200s on the market at "too good to be true prices". They are. The reason is that they are either not truly Hayes and/or Commodore compatible therefore not usable in all situations and all services. The Aprotek-1200C is both Hayes and Commodore compatible and 1200 baud. Why not get a modem that will satisfy your present AND future needs by going directly to an inexpensive Aprotek-1200C especially when we have it on sale?

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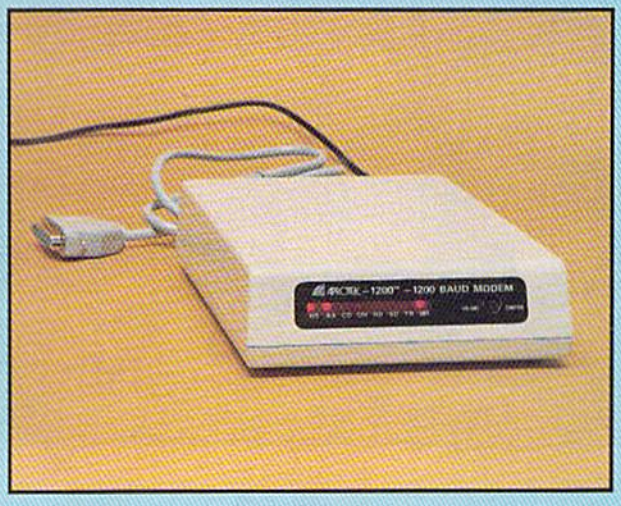

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Unscramble

Mark Tuttle

If you like word challenges, you'll like this two-player game where quick thinking and accurate guesses determine the winner. For the Commodore 128, 64, Plus/4, and 16.

Computers are traditionally known for their mathematical capabilities. Only recently, with the advent of word processors and spelling checkers, have computers affected the way we deal with words. With "Unscramble," you can use your Commodore to challenge a friend to a word game traditionally played as a board game or with pencil and paper.

Each player must guess five words which were entered by his opponent and scrambled by the computer. It sounds easy, but there is one obstacle—time. A timer runs while you think, and ten seconds are added to your score every time you guess a wrong letter. The winner is the player with the lowest score.

Typing It In

Unscramble is written entirely in BASIC. If you use a 64, type in the program as it is listed in the back of the magazine; 128 users must make the change indicated in line 10 of the listing. Plus/4 and 16 users must substitute these lines for the corresponding lines of the 64 program:

```
GB 10 COLOR0,2,4:COLOR4,7,2:CO
      =-1024:SC=3072:NDX=239
XM 20 VOL7
BR 660 SOUND1,PA*15,UPS/10:RET
      URN
```

After typing the program, save it with a command of the form

SAVE"UNSCRAMBLE",8

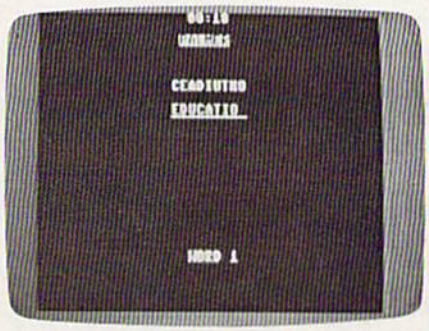
(Tape users should substitute a ,1 for the ,8.)

After saving a copy, load it with the command

LOAD"UNSCRAMBLE",8

(Tape users should substitute a ,1 for the ,8.)

Now, type RUN. Unscramble asks for the names of the players. After you enter the names, player 1 types in five words while player 2 looks away. (For a fair game, be sure that each player turns his head while the other player types in the words.) Words can be no longer than 15 characters. When player 1 has finished entering his words, player 2 sits at the computer to unscramble the words. Each scrambled word is displayed at the top of the screen. Player 2 must guess each letter in the word from left to right. If he guesses a wrong letter, a penalty of ten seconds is added to his score.



In "Unscramble," two players race the clock to decipher each other's words.

When player 2 has finished unscrambling the words, he enters five words for player 1 to unscramble. When player 1 has successfully unscrambled the words entered by player 2, the winner is announced and the game ends.

See program listing on page 94.

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Powerball

William Chin

This outstanding arcade-style game's moving obstacles, special features, and different game screens will keep you thinking and moving fast. For the Commodore 64. A joystick is required.

Not your ordinary version of *Breakout*, "Powerball" is an addictive, multifaceted arcade-style game with new features such as *capsules* and *slivers*—and ten different screens to master.

Each Powerball screen is populated by its own configuration of slivers, capsules, and bricks. After a few games you'll begin to develop strategies for each of the screens. As in *Breakout*, the object of the game is to destroy a series of walls brick by brick. In Powerball, this can be done in two ways—you may use your paddle to bounce balls against the wall, and you may shoot the wall down after catching a *fire* capsule. Unlike *Breakout*, you must quickly observe the characteristics of each type of screen object to earn high scores.

Typing It In

Powerball is written in machine language, so you'll need to use "MLX," the machine language entry program found elsewhere in this issue. When you run MLX, you'll be asked for the starting and ending addresses of the data you'll be entering. For Powerball, respond with the following values:

Starting Address: C000
Ending Address: CD67

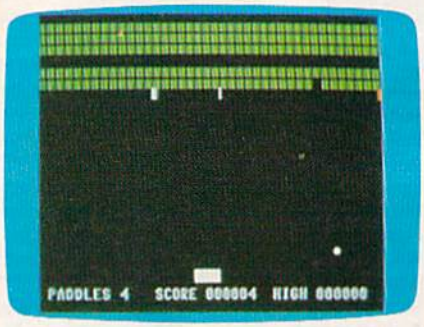
When you've finished typing in the data, save a copy to tape or disk before leaving MLX.

To play Powerball, enter LOAD"POWERBALL",8,1 (tape users should use LOAD"POWERBALL",1,1). Substitute the name you used to save the file. Start the game with SYS 49152.

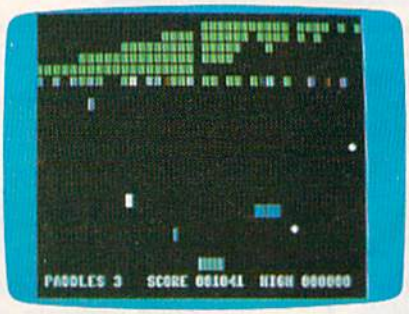
When the game begins, you'll see a paddle in the center of the screen near the bottom. Below the paddle you'll see an indication of the number of paddles remaining, your current score, and the high score of the current series of games. You begin each game with four paddles available (only one paddle can be active at any given time, however). Use a joystick in port 2 to move the paddle left and right. Press the fire button to release the ball and begin play.

Blasting Bricks

Your main weapon against the bricks is the bouncing ball. Use your paddle to keep the ball in motion. You'll lose a paddle whenever a ball gets past you to the bottom of the screen. The game ends when all paddles have been lost. When all breakable bricks on the current level have been eliminated, you advance to the next level. When you lose all your paddles, you are *not* automatically dumped back to the first level. Instead, you can press the fire button to start a new game at the current level. You can press SHIFT at any time to pause the game. (Use SHIFT-LOCK for longer pauses.)



Here's a scene from early in the game. Only one brick has been knocked out of the first wall. The three slivers are visible just below the wall.



Here, the player is using two balls to chip away the wall. An L capsule is rolling down the screen. If the player can catch it, his paddle (the gray bar at the bottom) will double in width.

Bricks come in three varieties: soft, hard, and solid. Soft bricks are green and are destroyed by being shot or by being hit by a ball. Hard bricks start out gray and change color each time they are hit. They must be turned green before they can be destroyed. Solid bricks are white. They can be destroyed only by a power ball. However, it's not necessary to destroy all the white bricks to advance to the next round.

Slivers And Capsules

Slivers and capsules are the special features that distingush Powerball from most other games of its type. Slivers are small flashing objects that change color as they float around the screen. Balls bounce off the slivers. This can be helpful at times (to deflect a descending ball), but, in general, slivers do more damage than good. Touching a sliver with your paddle sends the sliver to the top of the screen where it is least dangerous. There is no way to permanently destroy a sliver.

Capsules are the same shape as your paddle. They appear at random times and at random locations near the top of the screen, and then descend vertically down the screen. Touching a capsule with your paddle gives the paddle a special ability depending on the color of the capsule. (If you're using a monochrome display, each type of capsule also has a distinguishing label.) Below is a list of the capsule types and their corresponding powers:

Label	Color	Power
S	yellow	slows down all balls
C	green	paddle catches ball
L	blue	paddle becomes longer
F	red	paddle fires
P	purple	ball becomes power ball
3	lt. blue	ball splits into three balls
*	gray	extra paddle
N	orange	go to next screen

A standard paddle with no special powers is white. When a capsule is touched, the paddle takes on the color of the capsule to indicate its current power. A paddle can have only one power at a time; the previous power is lost each time a new capsule is touched. The special power is also canceled when the paddle is lost.

A few notes about the powers: When you've caught the green C capsule, your paddle will capture the ball so that you can reposition the paddle for an accurate shot. Press fire to release the ball. If you wait too long (about three seconds), the ball will be released automatically. The purple P capsule turns the balls into power balls, which destroy *all* types of bricks. After you capture a red F capsule, your paddle has the power to fire darts at the bricks as well as to deflect the ball. Press the fire button to shoot the darts. The light blue 3 capsule splits the ball into three individual balls (but only once each time one of these capsules is touched—you'll never get more than three balls). The split balls behave the same as the original ball, except that you don't lose a paddle until *all three* of the split balls have slipped past to the bottom of the screen. The gray * capsule adds an extra paddle to your total when touched. Touching an orange N capsule takes you to the next level, regardless of how many bricks remain on the current level. The gray * and the orange N capsules are rare.

See program listing on page 93.

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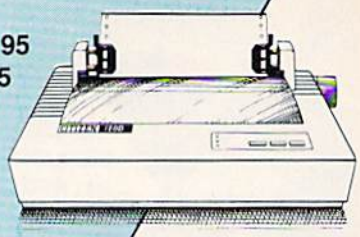

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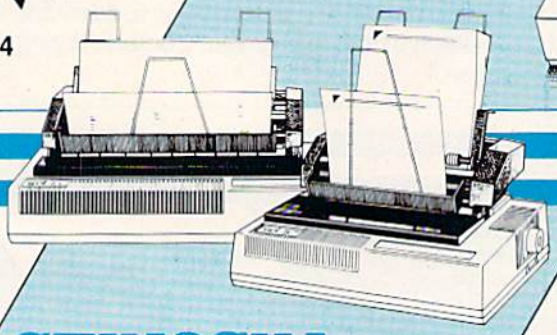

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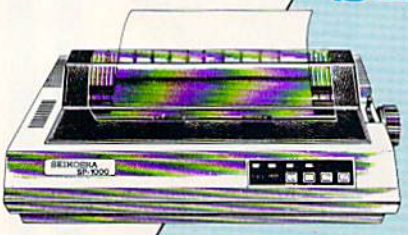

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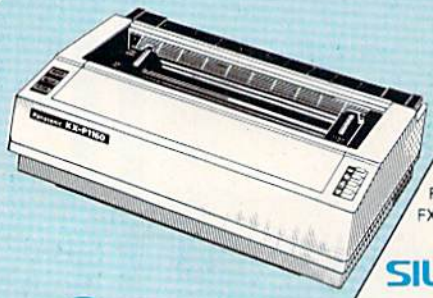

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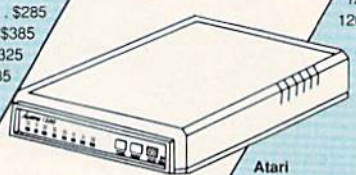

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If you're like a lot of people, you've probably accumulated a number of tape copies of your record albums or CDs. Or perhaps you use a Datassette for storage and have built up a large library of program tapes. While a tape can be recorded over and over, the cassette sleeve can be used only once. The result is mislabeled, unlabeled, or sloppy-looking tapes. "Cassette Sleeve Maker" lets you easily create your own cassette sleeves with your computer and printer. The sleeves are just the right size to slide into a standard cassette case.

After typing in the program, be sure to save a copy. The program works as listed on the 128, 64, Plus/4, or 16, and with any printer. When you want to make a sleeve, load and run the program. You'll be asked whether you want to enter information for one or both sides of the tape. For each side, you can enter up to 19 lines of information. Each line can be up to 19 characters long. The first 14 lines will be printed on the part of the sleeve that will show on the front of the cassette case, lines 15–16 will appear on the bottom when the sleeve is folded, and lines 17–19 will appear on the back.

Enter the names of the songs or programs on side A of the tape. Press RETURN after each name, or RETURN alone to enter a blank line. Avoid using the INST/DEL key to delete mistakes; instead use the cursor keys to move back and forth within the line to make corrections. After each line you'll be given a chance to correct any errors—just follow the prompts. If you have fewer than 14 entries for the front of the sleeve, you can enter an up arrow (↑) to skip ahead to the cassette identification field (line 15). You can use lines 15–16 for the name of the artist or group and the album that you recorded on side A. Lines 17–19 can be used for additional song or program names, or to list the artist and album name again.

If you selected the option to enter information for two sides, you'll now repeat the entry process for side B. When you've finished, the program will wait for you to get your printer ready. Press RETURN to print the sleeve. When the printout is complete, simply cut out the sleeve, fold on the dotted lines, and insert it into the cassette case.

See program listing on page 97.

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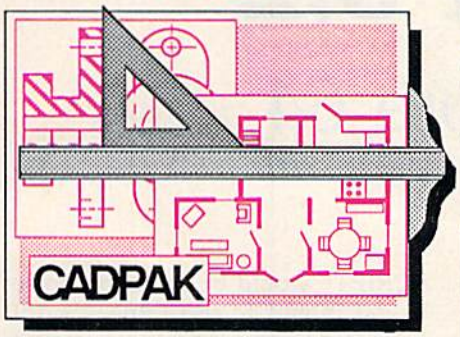

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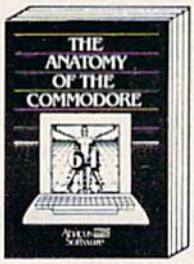

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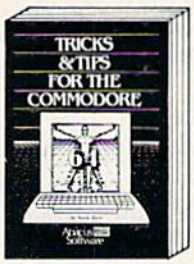

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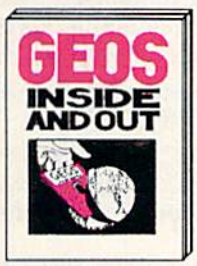

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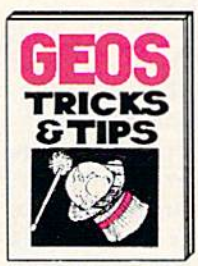

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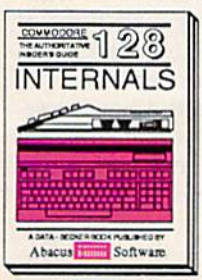

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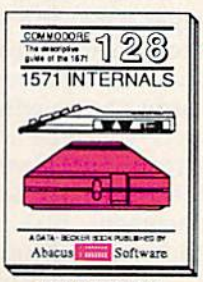

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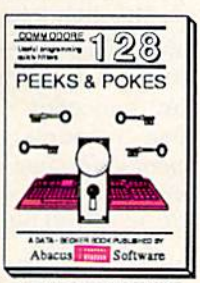

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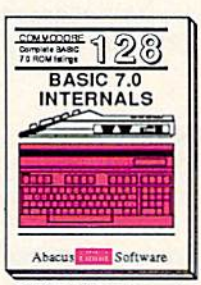

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SpeedScript 3.2

For The Commodore 64

Charles Brannon

Since its introduction in the January 1984 issue of COMPUTE!'s Gazette, SpeedScript *has been the most popular program ever published by COMPUTE! Publications. Written entirely in machine language,* SpeedScript *contains nearly every command and convenience you'd expect from a quality word processor. The latest version of Commodore 64* SpeedScript, *version 3.2, incorporates many improvements, readers' suggestions, and additional debugging. This version also works on a Commodore 128 in 64 mode.*

SpeedScript 3.2, though compact in size (6K), has many features found on commercial word processors. *SpeedScript* is also very easy to learn and use. You can start writing with it the first time you use it. You type in everything first; preview and make corrections on the screen; insert and delete words, sentences, and paragraphs; and then print out an error-free draft, letting *SpeedScript* take care of things like margins, centering, headers, and footers.

SpeedScript is a writing tool. It won't necessarily make you a better writer, but you may become a better writer once the tedium of retyping and erasing is replaced by the flexibility of a word processor. Words are no longer frozen in place by ink; they become free-floating entities. You no longer think about typewriting—you can stand back and work directly with words and ideas. The distinction between rough and final drafts becomes blurred as you perfect your writing as you write.

Typing In *SpeedScript*

SpeedScript is one of the longest programs we've ever published, but it's well worth typing in. Since *SpeedScript* is a machine language program, it must be entered with the "MLX" machine language entry program found elsewhere in this issue. (If you already have a copy of *SpeedScript 3.0* from the March 1985 issue of COMPUTE! or *SpeedScript 3.1* from the book *SpeedScript: The Word Processor for Commodore 64 and VIC-20*, it's not necessary to retype the entire program. Skip to the section entitled "The *SpeedScript* Family" for simple modifications to update your copy to version 3.2.)

When you run MLX, you'll be prompted for a starting address and an ending address for the data you'll be entering. For *SpeedScript 3.2*, respond with the following values:

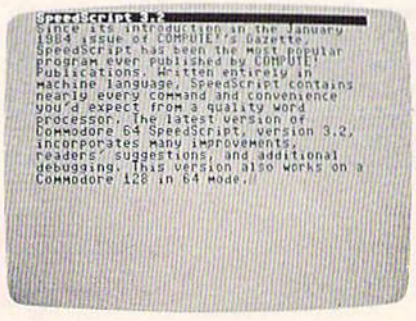
Starting Address: 0801
Ending Address: 2008

When you've finished typing in the data, save several copies to tape or disk before leaving MLX.

Loading *SpeedScript*

SpeedScript can be loaded just as if it were a BASIC program. If you load *SpeedScript* and list it, you'll see that it looks like a one-line BASIC program. This BASIC line is included to make the program easy to load, run, and copy. It's a good idea to save a couple of extra copies of *SpeedScript*, just in case the original is destroyed. To do this, type SAVE"SPEEDSCRIPT3.2",8 (or ,1 if you're using tape) after loading *SpeedScript*, just as you would for a BASIC program. Use whatever filename you like (although "SPEEDSCRIPT" would be the best choice if you intend to use "SpeedScript Date And Time Stamper" found elsewhere in this issue).

Before using *SpeedScript*, you should unplug any cartridges and expanders. *SpeedScript* cannot take advantage of any custom hardware configurations except those that do not interfere with normal operations.


Since its introduction in the January
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readers' suggestions, and additional
debugging. This version also works on a
Commodore 128 in 64 mode.

SpeedScript 3.2 *is the latest version of COMPUTE! Publications' popular full-featured word processor for the Commodore 64.*

Entering Text

When you run *SpeedScript*, the screen colors change to dark gray on light gray except for the top screen line, which is black with white letters. This *command line* is used to communicate with *SpeedScript*. *SpeedScript* presents all messages here. The remaining lines of the screen are used to enter, edit, and display your document. The *cursor* shows where the next character you type will appear on the screen. *SpeedScript* lets you move the cursor anywhere within your document, making it easy to find and correct errors.

To begin using *SpeedScript*, just start typing. When the cursor reaches the right edge of the screen,

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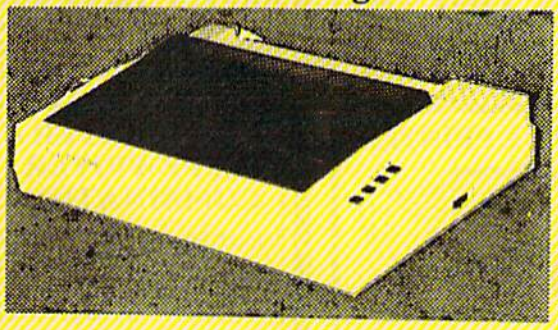

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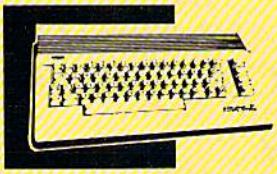

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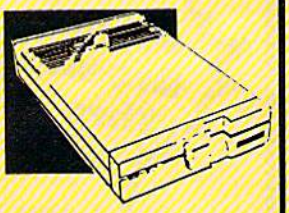

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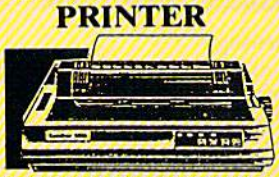

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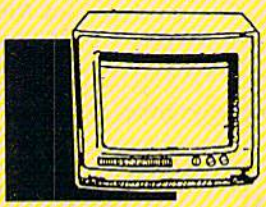

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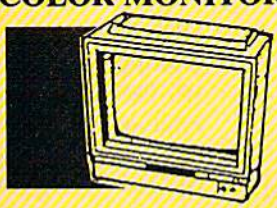

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it automatically jumps to the beginning of the next line, just as in BASIC. But unlike BASIC, *SpeedScript* never splits words at the right edge of the screen. If a word you're typing won't fit at the end of one line, it's instantly moved to the next line. This feature, called *word-wrap*, makes it much easier to read your text on the screen. Even if you make numerous editing changes, *SpeedScript* reformats the screen and rewraps all words.

Scrolling And Screen Formatting

When you finish typing on the last screen line, *SpeedScript* automatically scrolls the text upward to make room for a new line at the bottom. This is similar to the way BASIC works, but with one exception: The screen can scroll both up *and* down. Imagine the screen as a 24-line window on a long, continuous document.

More than 43K of text space is available in memory, room enough for 20–40 printed pages of text. To check at any time how much space is left, press **CTRL-=** (hold down the CTRL key while pressing the = key). The number which appears on the command line indicates how much room remains for characters of text.

If you're used to a typewriter, you'll have to unlearn some habits. First, since the screen is only 40 columns wide, and most printers have 80-column carriages, it doesn't make sense to press RETURN at the end of each line as you do on a typewriter. *SpeedScript*'s word-wrap takes care of this automatically. Press RETURN only when you want to force a carriage return to end a paragraph or to limit the length of a line. So that you can see these forced carriage returns, they appear on the screen as left-pointing arrows (called *return marks* in this article).

When you print your document, *SpeedScript* automatically formats your text to fit the width of the paper. Don't manually space over for a left margin or try to center a line yourself as you would on a typewriter. *SpeedScript*'s printing routine automatically takes care of all margins and centering and lets you customize the margin settings. Also, don't worry about where a printed page will end. When printing, *SpeedScript* automatically fits your text onto separate pages and can even put short phrases and page numbers at the top or bottom of each page if you want.

Like all good word processors, *SpeedScript* has a wide selection of editing and convenience features. You can move the cursor a single space in either direction, or skip to the next or previous word, sentence, or paragraph. You can also move the cursor to the top of the screen, the top of the document, or the end of the document. The INST/DEL key is used to insert a single space or delete a single character. Other features let you erase a word, sentence, or paragraph, and move or copy sentences, words, and paragraphs to other places in your document. Using Search-and-Replace, you can find any phrase and even automatically change one phrase to another throughout the entire document.

You can save your text on tape or disk, then load it later for additions and corrections. You can transpose (exchange) two characters, change the screen and text colors, send disk commands, read the disk error channel, and automatically tab over five spaces for paragraph indents. You don't need to learn all these commands right away, but you'll be glad they're available as you become more comfortable with word processing.

Using The Keyboard

Most of *SpeedScript*'s features are accessed with control-key commands—you hold down CTRL while pressing another key. In this article, control-key commands are abbreviated **CTRL-*x*** (where *x* is the key you press in combination with CTRL). An example is the **CTRL-=** mentioned above to check on free memory. **CTRL-E** means hold down CTRL and press E. Sometimes you have to hold down both SHIFT and CTRL as you type the command key, as in SHIFT-CTRL-H. Other keys are referenced by name or function, such as back arrow for the left-pointing arrow in the top-left corner of the keyboard, pound sign for the British pound symbol (£), CLR/HOME for the home-cursor key, SHIFT-CLR/HOME for the clear-screen key, f1 for special-function key 1, and up arrow for the upward-pointing arrow to the left of the RESTORE key.

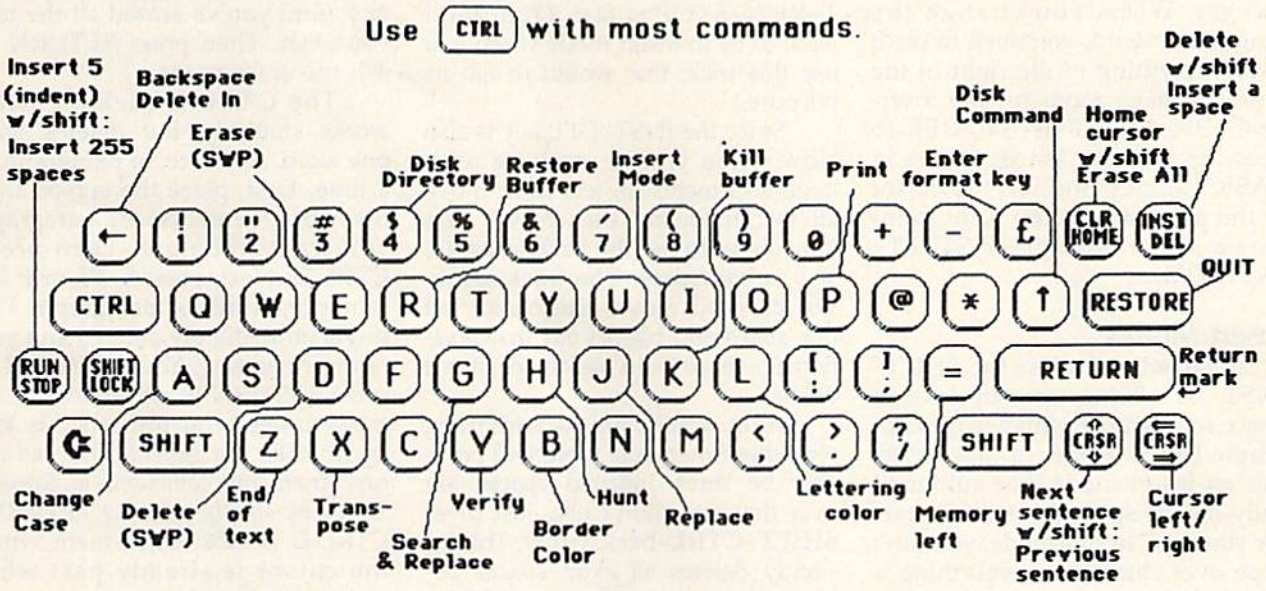
Some keys let you move the cursor to different places in the document to make corrections or scroll text into view. *SpeedScript* uses a unique method of cursor movement that is related to writing, not programming. Programmers work with lines of text and need to move the cursor up and down a line or left and right across a line. *SpeedScript*, however, is oriented for writers. You aren't working with lines of text, but with a continuous document.

Therefore, *SpeedScript* moves the cursor by character, word, sentence, or paragraph. *SpeedScript* defines a word as any sequence of characters preceded or followed by a space. A sentence is any sequence of characters ending with a period, exclamation point, question mark, or return mark. And a paragraph is defined as any sequence of characters ending in a return mark. (Again, a return mark appears on the screen as a left-pointing arrow.)

Here's how to control the cursor:

- The **left/right-cursor key** works as usual; pressing this key by itself moves the cursor right (forward) one space, and pressing it with SHIFT moves the cursor left (backward) one space.
- The **up/down-cursor key** moves the cursor forward to the beginning of the next sentence. Pressing it with SHIFT moves the cursor backward to the beginning of the previous sentence.
- The **f1 function key** moves the cursor forward to the beginning of the next word. The **f2 key** (hold down SHIFT and press f1) moves the cursor backward to the beginning of the previous word.
- The **f3 function key** moves the cursor forward to the beginning of the next sentence (just like the up/down-cursor key). The **f4 key** (hold down SHIFT and press f3) moves the cursor backward to the beginning of the previous sentence (just like pressing SHIFT and the up/down-cursor key).
- The **f5 function key** moves the cursor forward to the beginning of the next paragraph. The **f6 key** (hold down SHIFT and press f5)

Figure 1: *SpeedScript* Keyboard Map



CTRL A	Change case
CTRL B	Change border color
CTRL D	Delete (Sentence, Word, Paragraph)
CTRL E	Erase (Sentence, Word, Paragraph)
CTRL G	Global search and replace
CTRL H	Hunt for phrase with SHIFT: Select hunt phrase
CTRL I	Enter/exit insert mode
CTRL J	Replace with SHIFT: Select replace phrase
CTRL K	Kill buffer
CTRL L	Change text character color
CTRL P	Print
CTRL R	Restore buffer
CTRL V	Verify
CTRL X	Transpose characters
CTRL Z	Go to end of text
CTRL =	Display amount of free memory
CTRL ↑	Send disk command or read error channel
CTRL 4	Display disk directory
CTRL £	Enter format (printer) commands
CTRL 3	Commodore 64 only: Same as CTRL-£
CLR/HOME	Press once to go to top of screen Hold down to go to top of text with SHIFT: Erase all text
CRSR (left/right)	Move the cursor left one character with SHIFT: Move the cursor right one character
CRSR (up/down)	Got to next sentence with SHIFT: Go to previous sentence
RUN/STOP	Indent 5 spaces with SHIFT: Insert 255 spaces
RESTORE	Exit *SpeedScript* (Commodore 64) with RUN/STOP: Exit *SpeedScript* (VIC-20)
	Backspace with CTRL: Delete character under cursor and close up text with SHIFT and CTRL: Delete all spaces from cursor to next character
RETURN	Return mark with SHIFT: End paragraph, add an extra return mark, and indent next paragraph
INST/DEL	Delete character with SHIFT: Insert space

f1	Next Word
f2	Previous Word
f3	Next Sentence
f4	Previous Sentence
f5	Next Paragraph
f6	Previous Paragraph
f7	Load
f8	Save

moves the cursor backward to the beginning of the previous paragraph.

• **CLR/HOME**, pressed once by itself, moves the cursor to the top of the screen without scrolling. Pressed twice, it moves the cursor to the beginning of the document.

• **CTRL-Z** moves the cursor to the bottom of the document.

Correcting Your Typing

One strength of a word processor is that you need never have mistakes in your printed document. Since you've typed everything before you print it, you have plenty of opportunities to proofread and correct your work. The easiest way to correct something is just to type over it, but there are other ways, too.

Sometimes you'll have to insert characters to make a correction. Maybe you accidentally dropped a letter, typing *hngry* instead of *hungry*. When you change the length of a word, you need to push over everything to the right of the word to make room for the insertion. Use **SHIFT-INST/DEL** to open up a single space, just as in BASIC. Merely position the cursor at the point where you want to insert a space, and press SHIFT-INST/DEL.

Insert Modes

It can be tedious to use the SHIFT-INST/DEL key to open up enough space for a whole sentence or paragraph. For convenience, *SpeedScript* has an insert mode that automatically inserts space for each character you type. In this mode, you can't type over characters; everything is inserted at the cursor position. To enter insert mode, press **CTRL-I**. To cancel insert mode, press CTRL-I again. (This kind of command key, one which is used to turn something both on and off, is called a *toggle*). To let you know you're in insert mode, the normally black command line at the top of the screen turns blue.

Insert mode is the easiest way to insert text, but it can become too slow when you're working with a very long document because it must move *all* the text following the cursor position. Although *SpeedScript* uses turbocharged memory-move routines, the 6510 microprocessor can go only so fast. So *SpeedScript* has even more ways to insert blocks of text.

One way is to use the **RUN/STOP** key. It is programmed in *SpeedScript* to act as a five-space margin indent. To end one paragraph and start another, press RETURN twice and press RUN/STOP. Alternatively, you can press **SHIFT-RETURN**, which does this automatically. You can use RUN/STOP to open up more space than SHIFT-INST/DEL. No matter how much space you want to insert, each insertion takes the same amount of time. So the RUN/STOP key can insert five spaces five times faster than pressing SHIFT-INST/DEL five times.

There's an even better way, though. Press **SHIFT-RUN/STOP** to insert 255 spaces. This is enough room for a sentence or two. You can press it several times to open up as much space as you need. And SHIFT-RUN/STOP is *fast*. (You don't want to be in insert mode when you use this trick; that would defeat its purpose.)

Since the INST/DEL key is also slow when you're working with large documents (it, too, must move all text following the cursor), you may prefer to use the back-arrow (←) key to backspace. The **back-arrow** key by itself moves the cursor left one space and blanks out that position. It's more like a backspace than a delete.

After you're finished inserting with these methods, there will probably be some inserted spaces left over that you didn't use. Just press **SHIFT-CTRL-back arrow**. This instantly deletes all extra spaces between the cursor and the start of the following text. SHIFT-CTRL-back arrow is also generally useful whenever you want to delete a bunch of spaces.

Erasing Text

Inserting and retyping are not the only kinds of corrections you'll need to make. Part of writing is separating the wheat from the chaff. On a typewriter, you pull out the paper and throw it away. *SpeedScript* lets you be more selective.

Press the **INST/DEL** key by itself to erase the character to the left of the cursor. All the following text is pulled back to fill the vacant space.

Press **CTRL-back arrow** to delete the character on which the cursor is sitting. Again, all the following text is moved toward the cursor to fill the empty space.

These keys are fine for minor deletions, but it could take a long time to delete a whole paragraph this way. So *SpeedScript* has two commands that can delete an entire word, sentence, or paragraph at a time. **CTRL-E** erases text *after* (to the right of) the cursor position, and **CTRL-D** deletes text *behind* (to the left of) the cursor.

To use the **CTRL-E** (erase) mode, first place the cursor at the beginning of the word, sentence, or paragraph you want to erase. Then press CTRL-E. The command line shows the message *Erase (S,W,P): RETURN to exit.* Press S to erase a sentence, W for a word, or P for a paragraph. Each time you press one of these letters, the text is quickly erased. You can keep pressing S, W, or P until you've erased all the text you wish. Then press RETURN to exit the erase mode.

The **CTRL-D** (delete) mode works similarly, but deletes only one word, sentence, or paragraph at a time. First, place the cursor after the word, sentence, or paragraph you want to delete. Then press CTRL-D. Next, press S, W, or P for sentence, word, or paragraph. The text is immediately deleted and you return to editing. You don't need to press RETURN to exit the CTRL-D mode unless you pressed this key by mistake. *(In general, you can escape from any command in* SpeedScript *by simply pressing RETURN.)* CTRL-D is most convenient when the cursor is already past what you've been typing.

The Text Buffer

When you erase or delete with CTRL-E and CTRL-D, the text isn't lost forever. *SpeedScript* remembers what you've removed by storing deletions in a separate area of memory called a *buffer*. The buffer is a fail-safe device. If you erase too much or change your mind, just press **CTRL-R** to restore the deletion. However, be aware that *SpeedScript* remembers only the last erase or delete you performed.

Another, more powerful use of this buffer is to move or copy sections of text. To move some text from one location in your document to another, first erase or delete it with CTRL-E or CTRL-D. Then move the cursor to where you want the text to appear and press **CTRL-R.** CTRL-R instantly inserts the contents of the buffer at the cursor position. If you want to copy some text from one part of your document to another, just erase or delete it with CTRL-E or CTRL-D, restore it at the original position with CTRL-R, and then move the cursor elsewhere and press CTRL-R to restore it again. You can retrieve the buffer with CTRL-R as many times as you like.

Important: The CTRL-E erase mode lets you erase up to the maximum size of the buffer (12K, or over 12,000 characters). CTRL-E normally removes the previous contents of

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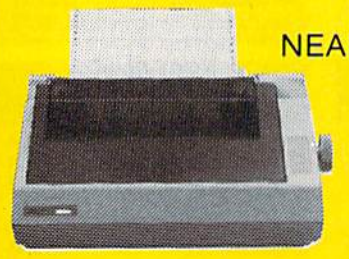

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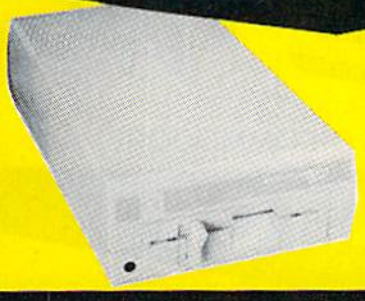

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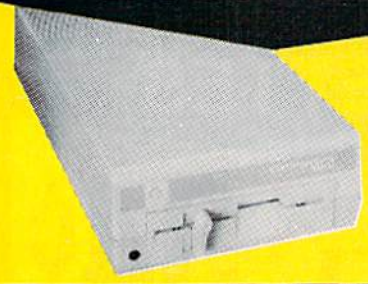

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the buffer each time it is used. Keep this in mind if there's something in the buffer you'd rather keep. If you don't want the current buffer contents to be erased, press **SHIFT-CTRL-E** instead. This preserves the buffer contents and adds newly erased text to the buffer.

Now you can see why CTRL-D lets you delete only a single sentence, word, or paragraph at a time. If it didn't, the deleted text would be added to the end of the buffer, and when you pressed CTRL-R to retrieve the buffer, the deleted text would be out of order (since CTRL-D deletes backward).

If you ever need to erase the contents of the buffer, press **CTRL-K** (remember *kill buffer*).

It's relatively easy to move blocks of text between documents. Using the buffer, you can load one document, erase some text into the buffer, load another document, and then insert the buffer contents into the new document. You can also use the buffer to save an often-used word or phrase, then repeat it whenever you need it.

Starting From Scratch

If you want to start a new document or simply obliterate all your text, press **SHIFT-CLR/HOME**. *SpeedScript* asks, *ERASE ALL TEXT: Are you sure? (Y/N).* This is your last chance. If you *don't* want to erase the entire document, press N or any other key. Press Y to perform the irreversible deed. There is no way to recover text wiped out with Erase All.

The RUN/STOP-RESTORE reset combination on the Commodore 64 has been disabled in *SpeedScript*.

As mentioned above, pressing RUN/STOP by itself inserts five spaces for indenting paragraphs.

Pressing just RESTORE brings up the message *Exit SpeedScript: Are you sure? (Y/N).* If you press Y for yes, you exit to BASIC. (If you press N or any other key at the prompt, you return to editing text with no harm done.) Once in BASIC you'll still have one chance to reenter *SpeedScript* without losing your text—simply enter RUN and your text should be intact when *SpeedScript* is restarted. (Your chances of recovering text decrease if you execute other commands while in BASIC.)

Search-And-Replace

Here's another feature only a computer can bring to writing. *SpeedScript* has a Hunt command that searches through your document to find a selected word or phrase. A Replace option lets you automatically change one word to another throughout the document. Since on the 64, CTRL-S is synonymous with the CLR/HOME key (try it), and since *SpeedScript* already uses CTRL-R, several command keys which are slightly less than mnemonic have been designated for these functions.

SHIFT-CTRL-H activates the Hunt feature, **SHIFT-CTRL-J** (J is used because it's next to the H) lets you selectively hunt and replace, and **CTRL-G** (Global) is for automatically searching and replacing.

Searching for something is a two-step process. First, you need to tell *SpeedScript* what to search for; then you must trigger the actual search. Press SHIFT-CTRL-H. The command line says *Hunt for:*. Type in what you'd like to search for—the *search phrase*—up to 29 characters. *SpeedScript* remembers the search phrase until you change it. (Incidentally, when you are typing on the command line, the only editing key that works is INST/DEL for backing up. *SpeedScript* does not let you enter control codes or cursor controls when you're typing on the command line.) Press RETURN after you've entered the search phrase. If you press RETURN alone without typing anything, the Hunt command is canceled.

When you're ready to search, press **CTRL-H** (without the SHIFT). *SpeedScript* looks for the next occurrence of the search phrase *starting from the current cursor position.* If you want to hunt through the entire document, press CLR/HOME twice to move the cursor to the very top before beginning the search. Each time you press CTRL-H, *SpeedScript* looks for the next occurrence of the search phrase and places the cursor at the start of the phrase. If the search fails (if the search phrase isn't found before the end of the document), you'll see the message *Not Found.*

CTRL-J (Replace) works together with CTRL-H. After you've specified the search phrase with SHIFT-CTRL-H, press SHIFT-CTRL-J to select the replace phrase. *SpeedScript* also remembers this replace phrase until you change it. You can press RETURN alone at the *Replace with:* prompt to select a *null* replace phrase. When you hunt and replace, this deletes the located phrase. To search and replace manually, start by pressing CTRL-H. After *SpeedScript* has found the search phrase, press CTRL-J (without SHIFT) if you want to replace the phrase. If you don't want to replace the phrase, don't press CTRL-J. You are not in a special search-and-replace mode. You're free to continue writing at any time.

CTRL-G links CTRL-H and CTRL-J together. It first asks *Hunt for:*, then *Replace with:*, and then automatically searches and replaces throughout the document starting at the cursor position.

A few hints and cautions: First, realize that if you use *the* as the search phrase, *SpeedScript* dutifully finds the embedded *the* in words like *therefore* and *heathen.* If you changed all occurrences of *the* to *cow*, these words would become *cowrefore* and *heacown.* If you want to find or replace a single word, include a space as the first character of the word, since almost all words are preceded by a space. Naturally, if you are replacing, you need to include the space in the replace phrase, too. Also, *SpeedScript* distinguishes between uppercase and lowercase. The word *Meldids* does not match with *meldids. SpeedScript* will not find a capitalized word unless you capitalize it in the search phrase. To cover all bases, you will sometimes need to make two passes when replacing a word. Keep these things in mind when using CTRL-G since you don't have a chance to stop an out-of-control search-and-replace.

Storing Your Document

Another advantage of word processing is that you can store your writing. A Commodore disk, with 170K of storage space, can store 80–150 pages of text as several document files. Tapes also have great storage capability—but they're slower.

It's easy to store a document. First, make sure your cassette or disk drive is plugged in and functioning. Insert a tape or disk into the drive. Press the **f8** function key (SHIFT-f7). You'll see the prompt *Save:*. Type in a filename for your document. A filename can be up to 16 characters long

and can include almost any characters, but do not use question marks or asterisks. You cannot use the same name for two different documents on a single disk. To replace a document already on disk using the same filename, precede your filename with the characters **@0:** or **@:**. You can also precede the filename with either **0:** or **1:** if you use a dual disk drive. *SpeedScript* cannot access a second disk drive with a device number of 9.

After entering the filename, answer the prompt *Tape or Disk* by pressing either the **T** or **D** key. You can cancel the Save command by pressing RETURN without typing anything else at either the *Save:* or *Tape or Disk* prompt.

After you press T for tape, press RECORD and PLAY simultaneously on the cassette drive. *SpeedScript* begins saving. If you press D for disk, your file is stored relatively quickly (if the disk is formatted and has room). After the Save, *SpeedScript* reports *No errors* if all is well, or reads and reports the disk error message otherwise.

The Commodore 64 is not able to detect errors during a tape Save, so *SpeedScript* provides a verify command. Rewind the tape, press **CTRL-V**, and then type the filename. Press T for tape; press PLAY on the recorder. *SpeedScript* will notify you if there is an error.

Loading A Document

To recall a previously saved document, press the **f7** function key. Answer the *Load:* prompt with the filename. Insert the tape or disk with the file you want to load and press T or D. Press PLAY if you're using tape. *SpeedScript* loads the file and should display *No errors.* Otherwise, *SpeedScript* reads the error channel of the disk drive or reports *Load error* for tape.

It's important to position of the cursor correctly before loading a file. *SpeedScript* starts loading at the cursor position, so be sure to press CLR/HOME twice or SHIFT–CLR/HOME (Erase All) to move the cursor to the start of text space, unless you want to merge two documents. When you press f7 to load, the command line turns green to warn you if the cursor is not at the top of the text space.

To merge two or more files, simply load the first file, press CTRL-Z to move the cursor to the end of the document, and then load the file you want to merge. Do not place the cursor somewhere in the middle of your document before loading. A Load does not insert the characters coming in from tape or disk into your old text, but overwrites all existing text after the cursor position. The last character loaded becomes the new end-of-text marker, and you cannot access any of your old text that may appear after this marker.

Disk Commands

Sometimes you forget the name of a file or need to scratch or rename a file. *SpeedScript* gives you full control over the disk drive. To view the disk directory, press **CTRL-4**. The directory will be displayed on the screen without affecting the text in memory. Press any key to pause scrolling. Afterward, press RETURN to switch back to your text. All the other disk commands are also accessible. Just press **CTRL-↑** (up arrow); then type in a 1541 disk command. You don't need to type PRINT#15 or any quotation marks as you do in BASIC—just the actual command. If you press RETURN without typing a disk command, *SpeedScript* displays the disk status. It also displays the status after completing a disk command. Here is a quick summary of disk commands:

n:*disk name,ID* This formats (NEWs) a disk. You must format a new disk before using it for the first time. The disk name can be up to 16 characters. The ID (identifier) is any two characters. You must use a unique ID for each disk you have. Don't forget that this command erases any existing data on a disk.

s:*filename* Scratches (deletes) a file from the disk.

r:*newname*=*oldname* Changes the name of file *oldname* to *newname.*

c:*backup filename*=*original name* Creates a new file (the backup copy) of an existing file (original copy) on the same disk.

i: Initializes a disk. This resets several disk variables and should be used after you swap disks or when you have trouble reading a disk.

v: Validates a disk. This recomputes the number of available blocks and can sometimes free up disk space. Always use Validate if you notice a filename on the directory flagged with an asterisk. Validate can take awhile to finish.

uj: Resets the disk drive to power-up state.

Additional Features

SpeedScript has a few commands that don't do much, but are still nice to have. **CTRL-X** exchanges the character under the cursor with the character to the right of the cursor. Thus, you can fix transposition errors with a single keystroke. **CTRL-A** changes the character under the cursor from uppercase to lowercase or vice versa. You can hold down CTRL-A to continue changing the following characters.

Press **CTRL-B** to change the background and border colors. Each time you press CTRL-B, one of 16 different background colors appears. Press **CTRL-L** to cycle between one of 16 character (lettering) colors. The colors are preserved until you change them. In fact, if you exit and resave *SpeedScript,* the program will load and run with your color choice in the future.

Printing

If you already think *SpeedScript* has plenty of commands, wait until you see what the printing package offers. *SpeedScript* supports an array of powerful formatting features. It automatically fits your text between left and right margins that you can specify. You can center a line or block it against the right margin. *SpeedScript* skips over the perforation on continuous-form paper, or it can wait for you to insert single-sheet paper. A line of text can be printed at the top of each page (a *header)* and/or at the bottom of each page (a *footer),* and it can include automatic page numbering, starting with whatever number you like.

SpeedScript can print on different lengths and widths of paper, and single-, double-, or triple-spacing (or any spacing, for that matter) is easy. You can print a document up to the size that can be held on a disk or tape by linking several files together during printing. You can print to the screen or to a sequential disk file instead of to a printer. Other features let you print to most printers using most printer interfaces, and send special codes to the printer to control features like

underlining, boldfacing, and double-width type (depending on the printer).

But with all this power comes the need to learn additional commands. Fortunately, *SpeedScript* sets most of these variables to a default state. If you don't change these settings, *SpeedScript* assumes a left margin of 5, a right-margin position of 75, no header or footer, single-spacing, and continuous-paper page feeding. To begin printing, simply press **CTRL-P**. If your printer is attached, powered on, and selected (online), *SpeedScript* begins printing immediately. To cancel printing, hold down the **RUN/STOP** key until printing stops.

Before printing, be sure the paper in your printer is adjusted to top-of-form (move the paper perforation just above the printing element). CTRL-P assumes a Commodore printer, so it's helpful if your interface simulates the modes and codes of the Commodore 1525, 1526, or MPS-801, -802, or -803 printers. CTRL-P prints with a device number of 4 and a secondary address of 7 (uppercase/lowercase mode).

If CTRL-P doesn't work for you, try another variation, **SHIFT-CTRL-P**. Answer the prompt *Print to: Screen, Disk, Printer?* with the single letter **S**, **D**, or **P**. Press any other key to cancel the command.

If you press P for printer, *SpeedScript* requests two more keystrokes. First, answer the *Device number* prompt with a number from 4 through 7. This lets you print to one of several printers addressed with different device numbers. Next, answer the *Secondary address* prompt with a number from 0 through 9.

Non-Commodore Printers

The secondary address is used on most non-Commodore printer interfaces to control special features. For example, you can bypass the emulation features and use graphics mode to communicate directly with your printer (see the true ASCII command below). Consult the list of secondary addresses in your printer interface manual. *SpeedScript* does not work properly with RS-232 serial printers or interfaces.

An additional note: Some printers and interfaces incorporate an automatic skip-over-perforation feature. The printer skips to the next page when it reaches the bottom of a page. Since *SpeedScript* already controls paper feeding, you need to turn off this automatic skip-over-perf feature (usually, by sending out control codes) before running *SpeedScript*, or paging won't work properly. Remember, sometimes the printer controls the skip-over-perf feature, sometimes the interface, and sometimes even both.

The Commodore 64 version of *SpeedScript* has been tested with the following printers: Commodore 1525 and 1526; MPS-801, -802, and -803; C. Itoh Prowriter 8510; Epson MX-80; Gemini 10-X; Star SG-10, SG-10C, and SD-10; Okimate 10 and 20; Okidata 82 and 92; and Hush-80 CD. *SpeedScript* has also been tested with these printer interfaces: Cardco A/B/G+ and G Wiz, Tymac Connection, Xetec, Turbo-Print, and MW-350. *SpeedScript* should work even if your printer or interface is not on this list. These are just the ones that have been tested.

Be sure your printer or interface supplies its own linefeeds. Again, consult your manuals and insure that either your printer or interface (but not both) supplies an automatic linefeed after carriage return. To test this, print a small sample of text with CTRL-P. Since the default is single-spacing, you should not see double-spacing, nor should all printing appear on the same line. If you still aren't getting linefeeds, use the linefeed command discussed below.

Printing To Screen And Disk

SHIFT–CTRL-P prints to the screen when you press S. The screen colors change to white letters on a black background, and what appears on the screen is exactly what would print on the printer. It takes two screen lines to hold one 80-column printed line, of course. If you use double-spacing (see below), it's much easier to see how each line is printed. With this screen preview, you can see where lines and pages break. To freeze printing, hold down either of the SHIFT keys, or engage SHIFT LOCK. The border color changes to white while SHIFT is held down. When printing is finished, press any key to return to editing.

SHIFT–CTRL-P prints to a disk file when you press D. Enter the filename when it's requested. *SpeedScript* sends out all printer information to a sequential file. You can use other programs to process this formatted file. Try this simple example:

```
10 OPEN 1,4
20 OPEN 2,8,8,"filename"
30 GET#2,A$:SS = ST: PRINT#1,A$;: IF
   SS = 0 THEN 30
40 PRINT#1: CLOSE1
50 CLOSE2
```

This program dumps the disk file specified by the filename in line 20 to any printer. You can use it to print *SpeedScript* files (produced with SHIFT–CTRL-P) on another Commodore computer and printer without running *SpeedScript*. Change line 10 to **OPEN 1,2,0, CHR$(6)** to dump the file to a 300-baud modem or RS-232 printer, or **OPEN 1,3** to display it on the screen.

Formatting Commands

The print-formatting commands must be distinguished from normal text, so they appear onscreen in reverse field with the text and background colors switched. You enter these reverse-video letters by pressing **CTRL-£** (pound sign) or **CTRL-3**, which is easier to type with one hand. Answer the prompt *Enter format key:* by pressing a single key. This key is inserted into text in reverse video. All lettered printer commands should be entered in lowercase (unshifted). During printing, *SpeedScript* treats these characters as printing commands.

There are two kinds of printing commands, which will be called stage 1 and stage 2. Stage 1 commands usually control variables such as left margin and right margin. Most are followed by a number, with no space between the command and the number. Stage 1 commands are executed before a line is printed.

Stage 2 commands, like centering and underlining, are executed while the line is being printed. Usually, stage 1 commands must be on a line of their own, although you

can group several stage 1 commands together on a line. Stage 2 commands are by nature embedded within a line of text. A sample stage 1 line could look like this:

l10r50s2

Embedded stage 2 commands look like this:

cThis line is centered.←
This isunderliningu.←

Stage 1 Commands

l Left margin. Follow with a number from 0 to 255. Use 0 for no margin. Defaults to 5. See Figure 2 for an illustration of margin settings.

r Right margin position, a number from 1 to 255. Defaults to 75. Be sure the right-margin value is greater than the left-margin value, or *SpeedScript* will become extremely confused. Some printer interfaces force a certain printing width, usually 80 characters wide. You'll need to disable this in order to permit *SpeedScript* to print lines longer than 80 characters.

t Top margin. The position at which the first line of text is printed, relative to the top of the page. Defaults to 5. The header (if any) is always printed on the first line of the page, before the first line of text.

b Bottom margin. The line at which printing stops before continuing to the next page. Standard 8½ × 11–inch paper has 66 lines on most printers (6 vertical lines of text per inch is standard for Commodore printers). Bottom margin defaults to the fifty-eighth line. The footer (if any) is always printed on the last line of the page, after the last line of text.

p Page length. Defaults to 66. If your printer does not print six lines per inch, multiply lines-per-inch by 11 to get the page length. European paper is usually longer than American paper—11⅝ or 12 inches. Try a page length of 69 or 72.

s Spacing. Defaults to single-spacing. Follow with a number from 1 to 255. Use 1 for single-spacing, 2 for double-spacing, and 3 for triple-spacing.

@ Start numbering *at* page number given. Page numbering normally starts with 1.

? Disables printing until selected page number is reached. For example, a value of 3 would start printing the third page of your document. Normally, *SpeedScript* starts printing with the first page.

x Sets the page width, in columns (think *a cross*). Defaults to 80. You need to change this for the sake of the centering command if you are printing in double-width or condensed type, or if you're using a 40-column or wide-carriage printer.

n Forced paging. Normally, *SpeedScript* prints the footer and moves on to the next page only when it has finished a page, but you can force it to continue to the next page by issuing this command. It requires no numbers.

m Margin release. Disables the left margin for the next printed line. Remember that this executes before the line is printed.

a True ASCII. Every character is assigned a number in the ASCII (American Standard Code for Information Interchange) character set. Most printers use this true ASCII standard, but Commodore printers exchange the values for uppercase and lowercase to match Commodore's own variation of ASCII. Some printer interfaces do not translate Commodore ASCII into true ASCII, so you need to use this command to tell *SpeedScript* to translate. Also, you will sometimes want to disable your interface's emulation mode intentionally in order to control special printer features that would otherwise be rejected by emulation. Place this command as the first character in your document, even before the header and footer definitions. Don't follow it with a number.

Since, in effect, the true ASCII command changes the case of all letters, you can type something in lowercase and use true ASCII to make it come out in uppercase.

w Page wait. Like the true ASCII command, this one should be placed at the beginning of your document before any text. With page wait turned on, *SpeedScript* prompts you to *Insert next sheet, press RETURN* when each page is finished printing. Insert the next sheet, line it up with the printhead, and then press RETURN to continue. Page wait is ignored during disk or screen output.

j Select automatic linefeeds after carriage return. Like **a** and **w**, this command must be placed before any text. Don't use this command to achieve double-spacing, but only if all text prints on the same line.

i Information. This works like REM in BASIC. You follow the command with a line of text, up to 255 characters, ending in a return mark. This line will be ignored during printing; it's handy for making notes to yourself such as the filename of the document.

h Header define and enable. The header must be a single line of text ending with a return mark (up to 254 characters). The header prints on the first line of each page. You can include stage 2 commands such as centering and page numbering in a header. You can use a header by itself without a footer. The header and footer should be defined at the top of your document, before any text. If you want to prevent the header from printing on the first page, put a return mark by itself at the top of your document before the header definition.

f Footer define and enable. The footer must be a single line of text ending in a return mark (up to 254 characters). The footer prints on the last line of each page. As with the header, you can include stage 2 printing commands, and you don't need to set the header to use a footer.

g Go to (link) next file. Put this command as the last line in your document. Follow the command with the letter *D* for disk or *T* for tape, then a colon (:), and finally, the name of the file to print next. After the text in memory is printed, the link command loads the next file into memory. You can continue linking in successive files, but don't include a link in the last file. Before you start printing a linked file, make sure the first of the linked files is in memory. When printing is finished, the last file linked to will be in memory.

Stage 2 Commands

These commands either precede a line of text or are embedded within one.

c Centering. Put this at the beginning of a line you want to center. This will center only one line, ending in a return mark. Repeat this command at the beginning of every

line you want centered. Centering uses the page-width setting (see above) to center the line properly. To center a double-width line, either set the page width to 40 or pad out the rest of the line with an equal number of spaces. If you use double-width, remember that the spaces preceding the centered text will be double-wide spaces.

e Edge right. This command will cause a line to be aligned with the right margin when it is printed. That is, spaces will be inserted in front of the line so that the last character in the line will be printed at the right margin. Place the command at the beginning of the line you want aligned; it will only affect one line at a time, each ending with a return mark. Repeat this command at the beginning of every line you want aligned to the right. Note that this is *not* the same as *right justification*—a feature found on some word processors that adjusts printing to align both the left and right margins—since the edge-right command aligns only one line, and only at the right margin. *SpeedScript* has no right-justification feature.

When *SpeedScript* encounters this command, it prints the current page number. You usually embed this within a header or footer.

u A simple form of underlining. It does not work on Commodore printers, but only on printers that recognize CHR$(8) as a backspace and CHR$(95) as an underline character. Underlining works on spaces, too. Use the first **u** to start underlining and another one to turn off underlining.

Fonts And Styles

Most dot-matrix printers are capable of more than just printing text at ten characters per inch. The Commodore MPS-801 can print in double-width and reverse field. Some printers have several character sets, with italic and foreign language characters. Most can print in double-width (40 characters per line), condensed (132 characters per line), and in either pica or elite. Other features include programmable characters, programmable tab stops, and graphics modes. Many word processors customize themselves to a particular printer, but *SpeedScript* was purposely designed not to be printer-specific. Instead,

Figure 2: Graphic Presentation of Margin Settings

Values shown are default settings

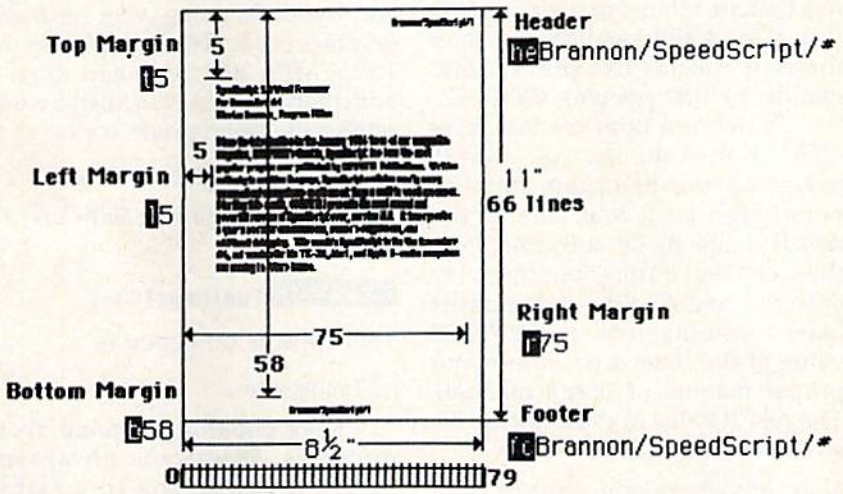

Figure 3: Quick Reference Chart Format (Printer Commands)

Enter these commands with CTRL-£ or CTRL-3:

Command	Description	Default	Command	Description	Default
a	True ASCII	off	n	Next Page	
b	Bottom Margin	58	p	Page Length *	66
c	Centering		r	Right Margin	75
e	Edge Right		s	Spacing	1
f	Footer		t	Top Margin	5
g	Goto Linked File *		u	Underline toggle	
h	Header		w	Page Wait	
i	Information *		x	Columns across *	80
j	Select linefeeds *		@	Initial page # *	1
l	Left Margin	5	?	Skip pages *	
m	Margin Release *		#	Print page number	

hc SpeedScript/#← Centered Header with page number

l10r70s2← Left margin 10, right margin 70, double spacing.

gD:SpeedScript.2← Goto and continue printing with filename "SpeedScript.2"

* Notes command changed or added since Version 2.0

SpeedScript lets you define your own stage 2 printing commands.

You define a programmable *printkey* by choosing any character that is not already used for other printer commands. The entire uppercase alphabet is available for printkeys, and you can choose letters that are related to their function (like *D* for double-width). You enter these commands like printer commands, by first pressing **CTRL-3**.

To define a printkey, just press CTRL-3, then the key you want to assign as the printkey, then an equal sign (=), and finally the ASCII value to be substituted for the printkey during printing. For example, to define the + key as the letter *z*, you first look up the ASCII value of the letter *z* (in either your printer manual or user's manual). The ASCII value of the letter *z* is 90, so the definition is **+ = 91←**

Now, anywhere you want to print the letter *z*, substitute the printkey:

Gad+ooks! The +oo is +any!←

This will appear on paper as

```
Gadzooks! The zoo is zany!
```

More practically, look up the value of reverse-on and reverse-off. Reverse-on, a value of 18, prints all text in reverse video until canceled by reverse-off (a value of 146) or a carriage return. So, define SHIFT-R as 18 and SHIFT-O as 146. Anywhere you want to print a word in reverse, bracket the word with printkey R and printkey O.

You can similarly define whatever codes your printer uses for features like double-width or emphasized mode. For your convenience, four of the printkeys are predefined, though you can change them. Printkey 1 is defined as a 27, the value of the ESCape code used to precede many two-character printer commands. (With some printer interfaces, you must send two ESCape codes to bypass the interface's emulation.) For example, the Epson command for double strike is ESC-G. You can select it in *SpeedScript* with

1G

Printkey 2, a value of 14, goes into double-width mode on most printers, and printkey 3, a value of 15, turns off double-width on some printers and selects condensed mode on others. Printkey 4 is defined as 18, which selects reverse field with Commodore printers (and on some graphics interfaces in emulation mode) or condensed mode on some other printers.

With so many codes available, you can even design custom logos and symbols using your printer's graphics mode. For example, on the 1525/MPS-801, you can draw a box (perhaps for a checklist) by first setting the appropriate codes:

1=8 2=25 3=255 4=193←

Then display the box with text by typing

13444432Toothpaste←

This appears on paper as

☐ Toothpaste

Keep one thing in mind about printkeys. *SpeedScript* always assumes it is printing to a rather dumb, featureless printer, the least common denominator. *SpeedScript* doesn't understand the intent of a printkey; it just sends its value out. So if you make one word within a line double-width, it may make the line overflow the specified right margin. There's no way for *SpeedScript* to include built-in font and type-style codes without being customized for a particular printer, since no set of codes is universal to all printers.

SpeedScript Mastery

It may take you awhile to fully master *SpeedScript*, but as you do you'll discover many ways to use the editing and formatting commands. For example, there is a simple way to simulate tab stops, say, for a columnar table. Just type a period at every tab-stop position. Erase the line; then restore it multiple times. When you are filling in the table, just use word-left/word-right to jump quickly between the periods. Or you can use the programmable printkeys to embed your printer's own commands for setting and jumping to tab stops.

SpeedScript can also be used as a simple database manager. Type in the information you need; then store it as a *SpeedScript* document. The search feature lets you quickly find information, especially if you use graphics characters to flag key lines. You can search for the graphics characters and quickly skip from field to field.

You don't have to change or define printer commands every time you write. Just save these definitions as a small text file, and load this file each time you write. You can create many custom definition files and have them ready to use on disk. You can create customized "fill in the blank" letters. Just type the letter, and everywhere you'll need to insert something, substitute a graphics symbol. When you're ready to customize the letter, just hunt for each graphics symbol and insert the specific information.

SpeedScript does not work with any 80-column video boards or software 80-column emulators. *SpeedScript* also wipes out most kinds of resident (RAM-loaded) software, including most software-simulated printer drivers. However, you can print to disk using SHIFT–CTRL-P, and then dump the disk file to the printer from BASIC.

File Compatibility

SpeedScript documents are stored as program files (PRG type on disk). Naturally, you can't load and run a *SpeedScript* file from BASIC. The characters are stored in their screen code (POKE) equivalents. Several commercial word processors store text similarly, including *WordPro* 3+ and *PaperClip*. As a matter of fact, two commercial spelling checkers designed for *WordPro* also work with *SpeedScript*: *SpellRight Plus* (from Professional Software) and *SpellPro 64* (from Pro-Line Software).

Program 2 is a *SpeedScript* file-conversion utility. It translates *SpeedScript* screen-code program files into either Commodore ASCII or true ASCII. The program works only with disk—not with tape. These translated files are stored in sequential format, the file type used in most file-processing applications. The file converter can also translate a Commodore ASCII sequential file into a screen-code *SpeedScript* program file. You can use the file converter to translate a database into a *SpeedScript* file (or vice versa), and you can convert *SpeedScript* files to true ASCII and use a modem program to upload them to another computer.

The *SpeedScript* Family

SpeedScript premiered in the January 1984 issue of the GAZETTE in the version we now refer to as *SpeedScript 1.0*. A slightly modified version (*1.1*) appeared in *COMPUTE!'s Second Book of Commodore 64*. The next major update, *SpeedScript 2.0*, appeared only on the first GAZETTE Disk, in May 1984. The original version of the currrent update, *SpeedScript 3.0*, was published in COMPUTE! in early 1985 (along with versions for other computers). Although version 3.0 is based on the earlier versions, it is sufficiently different that you cannot "patch" a copy of *SpeedScript 2.0* (or an earlier version) to bring it up to version 3.0. You must type in the entire program.

However, if you have a copy of *SpeedScript 3.0* or *3.1*, you *can* easily upgrade to version 3.2. Simply load, but do not run, your copy of *SpeedScript*; then enter the following POKEs and SAVE the new version with a different name. Be very careful when typing the POKE statements. A mistyped number could introduce a bug that would be difficult to locate.

```
POKE 2547,96:POKE 4316,200:POK
   E 4946,234:POKE 4947,234:PO
   KE 7716,50
POKE 5785,234:POKE 5786,234:PO
   KE 5787,234:POKE 7581,11:PO
   KE 7590,76
POKE 7591,86:POKE 7592,29:POKE
    7593,201:POKE 7594,35:POKE
    7595,208:POKE 7596,23
```

Version 3.2 doesn't add any new features or commands to versions 3.0 or 3.1; only a few minor bugs are corrected.

If you don't wish to type in the listing for *SpeedScript 3.2*, you may order the GAZETTE Disk for this month, which includes all the programs in this issue of COMPUTE!'s Gazette.

See program listings on page 100.

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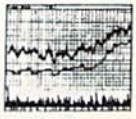

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A Guide To Commodore User Groups

Part 1

Caroline Hanlon

This list includes all the Commodore user groups in states beginning with the letters *A–M* (Alabama through Montana) that responded to our mailing. The user groups in the remaining states (Nebraska through Wyoming), APO, and foreign countries will be listed next month in Part 2. When writing to a user group for information, please remember to enclose a stamped, self-addressed envelope.

User groups are listed in each state in zip code order.

If your group does not appear in this list and you wish to be listed, send your club name and address to COMPUTE! Publications, Attn: User Group Update, P.O. Box 5406, Greensboro, NC 27403.

ALABAMA

Valley Commodore Users Group (VCUG), P.O. Box 835, Decatur, AL 35602-0835

Shoals Commodore User Group, 430 Nottingham Rd., Florence, AL 35630

Scottsboro Commodore Users Group, Rt. 5, Box 255, Scottsboro, AL 35768

Huntsville Alabama Commodore Komputer Society (HACKS), P.O. Box 14356, Huntsville, AL 35815

Sequoyah Users Group (SUG), 702 Williams Ave. N., Ft. Payne, AL 35967-2624

Montgomery Area Commodore Komputer Society (MACKS), P.O. Box 210126, Montgomery AL 36121-0126

East Alabama Users' Group, P.O. Box 249, Jacksonville, AL 36265

The Byte Bunch, 318 Perryman St., Evergreen, AL 36401

Commodore Mobile Users Group (CMUG), 3993 Cottage Hill Rd., #78, Mobile, AL 36609

Smiths Alabama Commodore User Group, Rt. 2, Box 105, Smiths, AL 36877

ALASKA

Anchorage Commodore Users, P.O.Box 104615, Anchorage, AK 99510-4615

Mat Su Commodore 64 Club, 3970 Ruth Dr., Wasilla, AK 99687

Sitka Commodore User's Group, P.O. Box 2204, Sitka, AK 99835

First City Users Group, Box 6002, Ketchikan, AK 99901

ARIZONA

Commodore User Group of Arizona, P.O. Box 21291, Phoenix, AZ 85036

Phoenix Arixona Commodore Club, P.O. Box 34905, Phoenix, AZ 85067

Arizona Commodore Users Group, P.O. Box 27201, Tempe, AZ 85282

Gila Hackers, Rt. 1, Box 34, Globe, AZ 85501

Catalina Commodore Computer Club, P.O. Box 32548, Tucson, AZ 85751

Canyon De Chelly-Four Corners Users Group, c/o Calumet Consulting, Box 1945, Chinle, AZ 86503

ARKANSAS

Commodore Computer Club of Pine Bluff, P.O. Box 1083, Pine Bluff, AR 71603

The Southwest Arkansas Commodore Users Group, 404 S. Greening St., Hope, AR 71801

Commodore 64/128 Users Group, P.O. Box 2481, Hot Springs, AR 71914

River City Commodore Club, P.O. Box 4298, N. Little Rock, AR 72116

The Stone 64 Users Group, P.O. Box 301, Reyno, AR 72462

The Personal Touch Commodore User Group of Hoxie and Walnut Ridge, 503 Kaylynn Dr., Walnut Ridge, AR 72476

Harrison Users Group, Rt. 1, Box 15, Harrison, AR 72601

Jintres Hillbilly's C64 User Group, 721 Drennen St., Van Buren, AR 72956

Ark-La-Tex Commodore Users Exchange (CUE), P.O. Box 6473, Texarkana, AR-TX 75505

CALIFORNIA

Hollywood Users Group (HUG) for Commodore Computer Owners, P.O. Box 38313 Hollywood, CA 90038

Cantell Commodore 64/128/CPM Mail Users Group (CMUG), c/o Cantell Computer Services, 3119 Isabel Dr., Los Angeles, CA 90065

South Bay Commodore Users Group (SBCUG) (suburban L.A.), P.O. Box 356, Manhattan Beach, CA 90266

Commodore 64 West Users Club (West L.A. and Santa Monica), P.O. Box 406, Santa Monica, CA 90406-0406

Begabytes C64, 9802 S. Calmada Ave., Whittier, CA 90605

West Orange County Commodore Users Group, P.O. Box 6441, Buena Park, CA 90622

Commodore Helpers of Long Beach, 3736 Myrtle Ave., Long Beach, CA 90807

Pasadena Commodore Computer Club, P.O. Box 1163, Arcadia, CA 91006

Librascope Computer Club, 833 Sonora Ave. MS 807, Glendale, CA 91201

West Valley Commodore Users Group, President, 23455 Justice St., Canoga Park, CA 91304

California Area Commodore Terminal User Society (CACTUS), P.O. Box 1277, Alta Loma, CA 91701

South Bay Commodore Users Group, P.O. Box 1899, Chula Vista, CA 92012-1899

Oceana-64 Commodore User Group, 1004 Plover Way, Oceanside, CA 92056

Back-Country Commodore Club, P.O. Box 373, Ramona, CA 92065

General Dynamics Commodore Computer Club, General Dynamics/ Electronics Division, P.O. Box 85227, MZ7205A, San Diego, CA 92138-5227

San Diego Commodore Users Group, P.O. Box 86531, San Diego, CA 92138

Hi Desert Commodore Users Group, 62026 Sunburst Cr., Joshua Tree, CA 92252

Commodore Users Group of Riverside (CUGR), P.O. Box 8085, Riverside, CA 92515

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Commodore Technical User Group (CTUG), P.O. Box 8342, Orange, CA 92664

64/20 Club, 6464 Shearwater St., Ventura, CA 93003

CIVIC64, P.O. Box 2442, Oxnard, CA 93034-2442

A Bakersfield Area Commodore Users Society (ABACUS), 3101 Oakridge Dr., Bakersfield, CA 93306

San Luis Obispo Commodore Computer Club, P.O. Box 3836, San Luis Obispo, CA 93403-3836

Simply Users of Computers Combining Experience for Strength and Success, 301 Veronica Dr., Paso Robles, CA 93446

Central Coast Commodore Users Group, 4237 Plumeria Ct., Santa Maria, CA 93455

Antelope Valley Commodore User Group (AVCUG), P.O. Box 4436, Lancaster, CA 93539

Madera Users Group (MUG), P.O. Box 783, Madera, CA 93639

PLUG (Plus/4 Users' Group), Box 1001, Monterey, CA 93942

Monterey Peninsula Commodore Group, P.O. Box 2105, Seaside, CA 93955

VISIONS-64, P.O. Box 26638, San Francisco, CA 94126

PET-On-The-Air, 525 Crestlake Dr., San Francisco, CA 94132

Diablo Valley Commodore User Group, P.O. Box 27155, Concord, CA 94527

Fairfield Commodore User's Group, 1758 San Jose Ct., Fairfield, CA 94533

Fremont, Union City, Newark, Hayward Users Group (FUNHUG), 36015 Pizarro Dr., Fremont, CA 94536

Napa Valley Commodore Computer Club, P.O. Box 2324, Napa, CA 94558

North Bay User's Group (NBUG), P.O. Box 7156, Vallejo, CA 94590

San Francisco Commodore Users Group, 2333D 9th Ave., Oakland CA 94606

Marin Commodore Computer Club, 665 Las Colindas Rd., San Rafael, CA 94903

PUG of the Silicon Valley, 22355 Rancho Ventura St., Cupertino, CA 95014

Commodore 64/More User Group, P.O. Box 26811, San Jose, CA 95159-6811

Stockton Commodore User's Group, 1911 Comstock Dr., Stockton, CA 95209

Valley Computer Club, P.O. Box 310, Denair, CA 95316

Santa Rosa Commodore User Group, 333 E. Robles Ave., Santa Rosa, CA 95407-7971

Amateurs and Artesians Computing, P.O. Box 682, c/o Alex KR6G, Cobb Mountain, CA 95426

Computer Users Group of Ukiah (CUGU), 9500 West Rd., Potter Valley, CA 95469

Auburn Commodore Computer Club, P.O. Box 4270, Auburn, CA 95603

Alpha Omega Telecommunications Group, P.O. Box 1339, Citrus Heights, CA 95611-1339

High Sierra Commodore Users Group, P.O. Box 8110, S. Lake Tahoe, CA 95731

North Valley Commodore User's Group, P.O. Box 1925, Chico, CA 95927

Commodore Owners Users Group of Redding (COUGOR), 2776-A Helen St., Redding, CA 96002

COLORADO

Colorado Commodore Computer Club, 11855 Adams St., Northglenn, CO 80233

First United Nocturnal Golden Users' Service (FUNGUS), 1869 West Campus Rd., Golden, CO 80401

North Colorado Commodore Users Group (NORCOCOM), 2138½ 10th St. Rd., Greeley, CO 80631

The Commodore Club, 4058 Baytown Dr., Colorado Springs, CO 80916

The Local Folks Computer Club, 1653-130 Rd., Glenwood Springs, CO 81601

CONNECTICUT

Bristol Commodore Users Group (BCUG), c/o Computech Systems, 178 Pine St., Bristol, CT 06010

Capital Region Commodore Computer Club (CRCCC), P.O. Box 2372, Vernon, CT 06066

Hartford County Commodore Users Group, P.O. Box 8553, East Hartford, CT 06108

Eastern Conn Commodore Users Group, 227 Jagger Ln., Hebron, CT 06248

Millstone Users Group-C64, Sillin Trng. Ctr., Ropeferry Rd., P.O. Box 128, Waterford, CT 06385-0128

Computer Users Group, 6 Saner Rd., Marlborough, CT 06447

Greater New Haven Commodore User Group, P.O. Box 796, North Haven, CT 06473

Commodore Users Group of Stratford, P.O. Box 1213, Stratford, CT 06497

Fairfield County Commodore User Group (FCCUG), P.O. Box 212, Danbury, CT 06813

Stamford Area Commodore Society (SACS), P.O. Box 2122, Stamford, CT 06906-0122

DELAWARE

Newark Computer Users Group (NCUG), 210 Durso Dr., Newark, DE 19711

The Brandywine Users Group (BUG), 157 Starr Rd., Newark, DE 19711

First State Commodore P.O. Box 1313, Dover, DE 19903

DISTRICT OF COLUMBIA

PentAF Commodore User Group, 1947 HSG MWR, Rm. 5E367, AF Rec. Services, Pentagon, Washington, DC 20330

Navy Micro User Group, c/o Clyde Williams, NAVDAC CODE 91, Washington, DC 20374

FLORIDA

Public Domain Users Group, P.O. Box 1442, Orange Park, FL 32067

Welaka Commodore Users Group, P.O. Box 1104, Welaka, FL 32093-1104

Commodore Computer Club, 8438 Lynda Sue Lane W., Jacksonville, FL 32217

Commodore Users Group of Pensacola, P.O. Box 3533, Pensacola, FL 32516

Fort Walton Beach Commodore Users Group, P.O. Box 3, Shalimar, FL 32579

Gainesville Commodore Users Group, Santa Fe Community College, P.O. Drawer 1530, Gainesville, FL 32602

Gainesville Commodore User Group, P.O. Box 14716, Gainesville, FL 32604-4716

Citrus Commodore Computer Club, P.O. Box 503, Beverly Hills, FL 32665

Lake County Educational Users Commodore Club, P.O. Box 326, Tavares, FL 32778

Titusville Commodore Club, 890 Alford St., Titusville, FL 32796

El Shift OH, P.O. 361348, Melbourne, FL 32936-1348

Miami Individuals With Commodore Equipment (MICE), 11110 Bird Rd., Miami, FL 33165

Miami 2064 Commodore Users Group, 11531 S.W. 84 St., Miami, FL 33173

Suncoast Bytes Commodore Computer Club, P.O. Box 721, Elfers, FL 33425

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Commodore Brooksville User Group (C-BUG), P.O. Box 1261, Brooksville, FL 33512

Clearwater Commodore Club, P.O. Box 11211, Clearwater, FL 33516

Bits and Bytes Computer Club, 1859 Neptune Dr., Englewood, FL 33533

R.H.C.C. Users Group 64/128, 8032 Banister Ln., Port Richey, FL 33568

Commodore Users Group of SW Florida, P.O. Box 7692, Ft. Myers, FL 33911

Charlotte County Commodore Club (CCCC), P.O. Box 512103, Punta Gorda, FL 33951-2103

GEORGIA

Metro BBS Society, 1842 Cashmere Ct., Lithonia, GA 30058

Griffin Commodore Program Exchange (GCPE), 1820 Hallmark Dr., Griffin, GA 30223

Stone Mountain Users Group (SMUG 64/128), P.O. Box 1762, Lilburn, GA 30247

C-64 Friendly Users Group, 775 Kings Rd., Athens, GA 30606

Commodore Club of Augusta, P.O. Box 14337, Augusta, GA 30919

Commodore Craze International, 1284 Lynn Dr., Waycross, GA 31501

HAWAII

Makai Commodore User Group (MCUG), P.O. Box 6381, Honolulu, HI 96818

Commodore Hawaii Users Group (CHUG), P.O. Box 23260, Honolulu, HI 96822; or 98-351 Koauka Loop, Apt. 1207, Aiea, HI 96701

Advanced Commodore Users Group, P.O. Box 25273, Honolulu, HI 96825

Commodore Hawaii User's Group (CHUG), 1114 Punahou #8A, Honolulu, HI 96826

IDAHO

PFP 64 Software Exchange, 742 E. 19th, Jerome, ID 83338

Banana Belt Commodore Users Group (BBCUG), P.O. Box 1272, Lewiston, ID 83501

GEM-64, Ken Rosecrans, 407 N. DeClark, Emmett, ID 83617

Commodore Treasure Valley/Boise Users Group (TV/BUG), P.O. Box 6853, Boise, ID 83707

ILLINOIS

PET VIC Commodore Users Group, 892 Knollwood, Buffalo Grove, IL 60089

Fox Valley PET (Commodore) Users Group, 833 Prospect Ave., Elgin, IL 60120

The Software Link, 763 Stewart Ave., Elgin, IL 60120

Computers West, 440 N. Stewart, Lombard, IL 60148

Computer Hackers of Illinois, 6800 Powell, Downers Grove, IL 60516

Chicago B-128 Users Group, 4102 N. Odell, Norridge, IL 60634

Knights of the Round Table, 1724 Pierce Ave., Rockford, IL 61103

Knox Commodore Club, 675 Arnold St., Galesburg, IL 61401

Western Illinois Commodore Users Group (WICUG), 906 W. 6th Ave., Monmouth, IL 61462

Canton Area Commodore Users Group, 13 N. 17th Ave., Canton, IL 61520

PAPUG (Peoria Area PET Users' Group), 800 SW Jefferson St., Peoria, IL 61605

Bloomington-Normal Commodore User Group (BNCUG), P.O. Box 1058, Bloomington, IL 61702-1058

Pros and Newcomers in Commodore (PANIC), c/o DACC, 2000 E. Main St., Danville, IL 61832

Champaign-Urbana Commodore User Group (CUCUG), 802 N Parke St., Tuscola, IL 61935

Meeting 64/128 Users Through the Mail, 51 Thornhill Dr., Danville, IL 61832

East Side Computer Club, P.O. Box 1347, Alton, IL 62002-1347

Western Illinois PET User Group (WIPUG), Rt. 5, Box 75, Quincy, IL 62301

Southern Illinois Commodore-Amiga Club, 1707 E. Main St., Olney, IL 62450

Decatur Commodore Computer Club (DC3), 664 W. Grand, Decatur, IL 62522

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Southern Illinois Commodore User Group, 508 W. Collins, Goreville, IL 62939

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Midwest C-64 Users Group (MW64UG), P.O. Box 9311, Highland, IN 46322

Stueben Commodore Users Group (SCCUG), P.O. Box 25, Pleasant Lake, IN 46779

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Logansport Commodore Club, P.O. Box 1161, Logansport, IN 46947

QS! Alliance (QS/INKY), P.O. Box 1403, New Albany, IN 47150

Richmond Area Commodore Users Group, P.O. Box 1332, Richmond, IN 47375

Bloomington Commodore Users Group (BCUG), 4755 Kinser Pike, Bloomington, IN 47401

Commodore Computer Club, P.O. Box 2332, Evansville, IN 47714

Commodore Owners of Lafayette (COOL), P.O. Box 5763, Lafayette, IN 47903

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Commodore Users Group, Ames Region (COUGAR), P.O. Box 2302, Ames, IA 50010-2302

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3C Users Group, R.R. 3, Box 20, Charles City, IA 50616

Product Engineering Center Commodore Users Group (PECCUG), 333 Joy Dr., Waterloo, IA 50701

Syntax Errors Anonymous Commodore User Group, R.R. Box 6894, Spirit Lake, IA 51360

Crawford County Commodore Users Group, 519 N. 19th St., Denison, IA 51442

Iowa City Commodore Users Group (ICCUG), P.O. Box 2412, Iowa City, IA 52244

Washington Area Commodore Users Group, P.O. Box 445, Washington, IA 52353

Penn City User Group, R.R. 1, Box 390, Fort Madison, IA 52627

Quad Cities Commodore Computer Club, P.O. Box 3994, Davenport, IA 52808

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Lawrence Commodore User's Group, P.O. Box 2204, Lawrence, KS 66045
TCCUG, P.O. Box 8439, Topeka, KS 66608
Newton Area Commodore Club, 112 Brookside, Newton, KS 67114
65XX Assemblers & Telecommunicators, 617 Lincoln, Sedgwick, KS 67135
Parsons Commodore Computer Users Group, 714 S. 35th St., Parsons, KS 67357
Commodore User's Group of McPherson (CUGOM), 1009 Sycamore Pl., McPherson, KS 67460
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Your Commodore Users Group, Brunswick Chapter, 103 Main St., Topsham, ME 04086
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MARYLAND

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Commodore Computer Club, Southern Station, Box 10076, Hattiesburg, MS 39406-0076
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Commodore Biloxi User Group (ComBUG), 3004-2 Hwy. 90 E., Ocean Springs, MS 39564
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Software Source, 4550 W. Beach, Biloxi, MS 39531

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Northland Amateur Radio Association, 811 Lindenwood Ln., Liberty, MO 64068
Commodore Users Group of Warrensburg, P.O. Box 893, Warrensburg, MO 64093
Joplin Commodore Computer User Group, 422 S. Florida Ave., Joplin, MO 64801
Mid-Missouri Commodore Club, P.O. Box 7026, Columbia, MO 65205-7026
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SpeedSearch

Tony St. Clair

This clever utility performs a rapid search through every SpeedScript 3.x *file on a disk to find any word or phrase that you specify.*

If you've forgotten which *SpeedScript* file contains a certain name, phone number, or whatever, "SpeedSearch" can solve your problem. SpeedSearch searches through every *SpeedScript* file on a disk, looking for a key word or phrase that you choose. It eliminates frustrating manual searches of text files.

Typing It In

SpeedSearch should be entered using the "MLX" machine language entry program found elsewhere in this issue. Be sure you understand the instructions for using MLX before you begin entering the data. When you run MLX, you'll be asked for a starting address and an ending address for the data you're entering. For SpeedSearch, respond with the following data:

Starting Address: 0801
Ending Address: 0BB0

When you've finished typing in SpeedSearch, be sure to save a copy on disk.

To use the program, type LOAD"SPEEDSEARCH",8. Then place the disk— containing *SpeedScript* files—that you want searched into the drive and type RUN. You are asked for a search phrase. In response, type in any combination of letters, numerals, and punctuation marks, up to a total of 25 characters. If punctuation marks or spaces are to be included in the search, the entire string should be enclosed in quotation marks. The search is not case-sensitive, so *Cat*, *CAT*, and *cat* would all be found in the sentence *The cat drank too much milk.* Reversed characters are converted to their nonreversed equivalent during the search. The RUN/STOP key can be pressed at any time to halt the program.

Screening For *SpeedScript*

Once you've entered a phrase, SpeedSearch begins searching the disk for *SpeedScript* text files. It uses two criteria for identifying these files. First, it considers only files that are stored as program (PRG) files, bypassing any sequential files. Second, it accepts only files that have a particular load address. As listed, SpeedSearch expects a load address of 9472, the value for documents created by an unmodified version of *SpeedScript 3.0* or higher. Other versions of *SpeedScript* will have a different load address. For example, files created by *SpeedScript 2.0* will have a load address of 10240. Several of the add-on utilities published in GAZETTE and COMPUTE! change the starting address of documents created with the modified versions of *SpeedScript*. For example, documents created using a copy of *SpeedScript* which includes the "Fontmaker" option from the January 1986 issue of COMPUTE! will have a load address of 12544. In these cases, SpeedSearch can be made to recognize these files by POKEing the low byte of the load address into location 2534 and the high byte into location 2542. If you wish to make the changes permanent, be sure to save a copy of the new SpeedSearch after making the changes. There are several utilities available to determine the load address of files stored on disk, including "MetaBASIC" from the February 1987 issue.

Searching The Document

Once a file has been determined to be a *SpeedScript* file, the entire file is scanned for your phrase. As the file is searched, the message SEARCHING...*filename* is printed. After the file has been scanned, a summary is displayed indicating the number of times the desired string was located in that file. This continues until all files have been processed or until the program is stopped. If you put a disk with no *SpeedScript* files in the drive, the message *No SpeedScript files found on this disk* is displayed.

With the information provided by SpeedSearch, you'll be able to choose the correct file every time you use *SpeedScript*.

See program listing on page 99.

SpeedScript Date And Time Stamper

Bob Kodadek

With this utility installed, every file you create with SpeedScript 3.2 *will have a date and time "stamp"—which makes it easy to find the most recent version of a letter or other* SpeedScript *file. A disk drive is required.*

Imagine how valuable it would be to know the origination date of all your *SpeedScript* files. "*SpeedScript* Date And Time Stamper" adds this capability to *SpeedScript* 3.2. Once the program is installed, all *SpeedScript* files are automatically date- and time-stamped. A new *SpeedScript* directory routine displays all the usual information plus the date and time that each file was created. The current date and time is also displayed in full literal form—you'll see May 3, 1987, not 5/3/87.

Typing It In

SpeedScript Date And Time Stamper consists of two programs. Program 1, "*SpeedScript* Date and Time," is written in machine language. It must be entered using the "MLX" machine language editor found elsewhere in this issue. When you run MLX, you'll be asked for the starting and ending addresses of the data you'll be entering. For *SpeedScript* Date And Time, respond with the following values:

Starting address: C8FB
Ending address: CF8A

After entering the data, save a copy of Program 1 with the filename "SPEEDSCRIPT DATE". Program 2 expects this filename.

Program 2, "Date And Time Loader," is written in BASIC. After typing it in, be sure to save a copy onto the same disk on which you saved Program 1.

To use *SpeedScript* Date And Time Stamper, load and run the BASIC loader (Program 2). It will automatically load SPEEDSCRIPT DATE. You'll then be prompted for the current date and time. The program screens out incorrect data and proceeds to the next prompt only after you've supplied the information in the required format. At this point you'll be asked to insert a disk containing a copy of the *SpeedScript* word processor. This file must be named SPEEDSCRIPT. After you've pressed RETURN, *SpeedScript* is loaded. From now on, the date and time are stamped onto every file you save from within *SpeedScript*. To see the information, press CTRL-4 for the modified directory.

Behind The Stamp

The actual stamping occurs in an unused area in the directory sector of the file and is accomplished by a machine language routine which is sent into the disk drive itself. The stamping operation is immediate, and the entire disk is still available for storage. A stamped disk may still be used normally, since the date and time stamp is transparent to the standard DOS routines.

The new directory is accessed in the normal fashion—by pressing the CTRL-4 key combination. This routine prints the current date and time at the top of the screen followed by the directory information. All of the usual information is displayed in the typical Commodore layout. However, the file type had to be abbreviated in order to accommodate the date and time stamp. The file types are displayed as PG, SQ, UR, and RL, and are self-explanatory. So-called *poison* (or *splat*) and *locked* files are indicated as usual. Also notice that filenames are no longer in quotes. The listing can be paused by pressing the space bar and stopped by pressing RUN/STOP.

The program doesn't alter *SpeedScript*'s other functions in any way. You'll notice after saving a document that the drive light will come back on momentarily. This is the date and time stamp being applied to the directory sector of the file. The utility is disabled when you exit *SpeedScript*. To restart, type SYS 51487.

See program listings on page 98.

ScriptRead

Buck Childress

This versatile utility allows you to read any SpeedScript *file (version 2.x or 3.x) at high speed. Among its features are automatic word-wrapping and word counting. It also has a scratch command to remove unwanted files. A disk drive is required.*

After a while, your *SpeedScript* disks can become overcrowded with files. Even with the most descriptive of filenames, it's hard to remember the contents of every file. "ScriptRead" lets you read through any number of *SpeedScript* files, scratching any that are no longer needed. And since ScriptRead works so fast, it can also help you to locate a particular file—without your having to waste time loading file after file into *SpeedScript*.

Using The Program

ScriptRead is written in BASIC but includes machine language subroutines. Since the program requires exact typing to work properly, be sure to use the "Automatic Proofreader" program located elsewhere in this issue to enter it. Save a copy to disk before attempting to run the program.

To use the program, load it and type RUN. The program asks what you would like to do. Press M to see a menu of your options.

You may change the screen colors for easier viewing by pressing T to change the text color and B to change the background color.

Press D to see the disk directory. Press CTRL to slow the directory listing. Press Q to quit the listing.

To read the contents of a file, press R and then type the name of the file. ScriptRead displays the file on the screen. Since ScriptRead includes an automatic word-wrap function, you'll never have to contend with words that are split between two lines. Press CTRL to slow the listing, any function key to pause it, or Q to quit reading the file. When the end of the file is reached, the number of words in the file is displayed.

Press S to scratch a file. ScriptRead asks for the name of the file to scratch. Type in the name of the file you wish to erase, or press RETURN if you don't wish to erase any files.

If you encounter a disk error (your disk drive light blinks on and off), press E to read the error channel. See your disk drive manual for an explanation of disk errors.

You may press RUN-STOP at the "What would you like to do?" prompt to exit ScriptRead.

See program listing on page 105.

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computing for families

Computers And Learning: Which Future For You?

Fred D'Ignazio
Associate Editor

I have seen the future, and it is awesome.

Recently I had an opportunity to visit a new *Interactive Learning System* classroom at a local high school. Twenty-five students were sitting at twenty-five microcomputers, looking like bionic kids. They were wearing headphones to hear their computers talk and play the music and sound effects accompanying their lesson. They controlled their computers by talking into a microphone attached to their headphones. All the computers were wired together into a local area network which shared a laser printer and a 20-megabyte hard disk drive. The students seemed totally absorbed in their lesson (which appeared to be an "earth science" unit about the ionosphere). They hunched over their computer keyboards, their eyes locked onto the color display screens.

They reminded me of my son when he watches the Saturday morning cartoons. A firecracker could have exploded beside them and they wouldn't have noticed.

I asked the students' teacher how much such a setup cost.

"Only $145,000," said the teacher proudly. "Ninety-five thousand for the computers, thirty thousand for the proprietary software, and another twenty thousand for the technician who operates and maintains all the equipment."

"Do you really need a paid technician?" I asked. "Can't a teacher be trained to do the same job?"

"No way," said the teacher, shaking his head. "The system is too complicated. You need someone devoted to it full-time. It's like an expensive race car—to keep it on the track you have to fuss with it constantly."

The Good Old Days

While I stood and marvelled at this super-high-tech classroom, I couldn't help remembering the first time I'd taken a computer into a school. It was 1974, and I was a COBOL programmer fleeing from a mindless programming job in the subbasement of the Pentagon. I took my TI Execuport terminal, plugged it into the school telephone, and introduced elementary-school kids to computers by teaching them to program simple games in BASIC.

I kept 27 third graders spellbound for over an hour with a remote terminal the size of a sewing machine and a book of computer games.

Of course I wasn't trying to teach high-school kids about earth science. I just wanted to turn kids on to computers.

Scratching Your Head

When my first COMPUTE! column appeared in April 1982, it began with a cartoon of a funny-looking little man kneeling on the floor surrounded by all kinds of computer parts. The man was soldering some parts together and looking like he was having a great time.

That little man was me.

He was also the thousands of other computer hobbyists who first got into personal computers because of the way they were so *unformed*—like Lego blocks which you had to assemble yourself.

As I looked at the students in the high-tech learning lab, I realized how far we have come since those early days in personal computers. It made me realize we are on the verge of entering a new era in which microcomputers officially become an "appliance"—like a car, microwave oven, or TV set. All the complexities, all the frustrating details of making a computer run will no longer matter. If something breaks down, we'll take the computer to the repair shop and have it serviced. The teacher is spared the nuisance of having to install, maintain, and service her classroom computers. She'll turn the whole mess over to a trained expert.

"It's about time!" you say. And you may be right; perhaps it's a good thing. After all, teachers don't have time to fuss and fume over cables, adapters, circuit cards, disks, and other computer paraphernalia.

But what about the students? When we tame technology and cover up all those messy wires and glitches, are we enriching or impoverishing our students' learning? If all technology becomes as transparent or invisible as a car's carburetor or a refrigerator's electric motor, how can a student ever learn about technology?

Let's look at the bottom line for a moment. How does a learning lab compare with a *pencil*? Which is the more versatile tool? Which is more creative, more open-ended? Which is more personal? Which tool gives a student more control over the *process* of learning rather than limited goals and objectives?

Which is cheaper?

And what happens if the learning lab's technician can't come in to work?

simple answers to common questions

Tom R. Halfhill, Staff Editor

Each month, COMPUTE!'s Gazette tackles some questions commonly asked by Commodore users. If you have a question you'd like to see answered here, send it to this column, c/o COMPUTE!'s Gazette, P.O. Box 5406, Greensboro, NC 27403.

Q. I plan to buy a modem. Do I need things like QuantumLink to make it work? Also, do I have to pay extra phone charges when I use the modem? If I upgrade my system to a Commodore 128, will I need a different modem in 128 mode than in 64 mode? If so, are there any modems that work in both 128 and 64 mode?

A. The word *modem* stands for *modulator/demodulator*. Simply put, it's a device which connects a computer to a standard telephone line. It allows a computer to transmit information to another modem-equipped computer by converting the data into audio tones which are carried by the phone line. At the other end, the tones are converted back into the original data by the other modem.

You don't pay extra phone charges when using a modem because as far as the phone company is concerned, you're making an ordinary phone call. If you call another computer long-distance, you pay the long-distance rates that you would if you placed a voice call to the same city at the same time of day. (There's one exception, which we'll explain in a moment.)

The only thing you need to make a modem work—besides a telephone line and the appropriate terminal software running on your computer—is another modem-equipped computer to call. The other computer and modem can be next door or on the other side of the world.

QuantumLink is a commercial information service that specializes in Commodore computers. An information service is like a large, electronic bulletin board that offers a number of services, including a library of public domain programs; public messages; private electronic mail; and online conferencing (something like a national "party line" in which dozens of people can participate in a conversation by typing on their keyboards). Other popular information services which cater to owners of many different kinds of computers are CompuServe, The Source, Delphi, GEnie, and PeopleLink.

You can also use a modem to call any of the hundreds of bulletin board systems (BBSs) spread throughout the world. Unlike the commercial information services, which are operated on large mainframes or minicomputers, BBSs are typically run on a single personal computer by a hobbyist. They offer similar services, but on a smaller scale. Check your local user group for a list of popular BBSs.

Extra charges are usually assessed only when you call a commercial information service with your modem. Most services have hourly rates ranging from $3 to $15. (An exception is QuantumLink, which charges a flat fee of $9.95 per month and $3.60 per hour for certain services.) The bigger information services have local phone numbers in most major metropolitan areas, so you don't have to place a long-distance call to reach them. If you live outside these areas, you can link up through a special long-distance network that costs a few dollars an hour.

All modems that work with the Commodore 64 are also compatible with the Commodore 128, so you won't need to buy a new modem if you upgrade. The same modem works in either 64 or 128 mode, as well as in CP/M mode.

Q. I've noticed there are programs on the Atari 130XE that allow the extra 64K to be used as a RAM disk. Is there a way of doing this on the Commodore 128 in 64 mode? This could be a really useful capability. I can also imagine that using part of a memory expansion module to set up a number of RAM disk drives in 64, 128, or CP/M mode would be nice to do.

A. Setting up a RAM disk on the Atari 130XE is a little easier in one sense because it's not a multimode computer. In addition to its regular 64K, the 130XE has four extra 16K banks which are available at any time. The Commodore 128, on the other hand, is really three computers in one: a 128, a Commodore 64, and a CP/M machine. The 128K of memory available in 128 mode is not "visible" to the computer in 64 mode. This was a necessary design compromise to insure full 64 compatibility.

You could set up a RAM disk using the 64K of memory available in 64 mode—in fact, this has already been done on the Commodore 64—but the RAM disk would have to be relatively small to leave room for your program. To overcome this limitation, Commodore has introduced a 256K memory expander for the 64. (For more on this product, see the feature on data storage elsewhere in this issue.) This $129 module plugs into the user port and comes with software to set up two different kinds of RAM disks. One RAM disk is for normal 64 applications, and the other is for use with *GEOS (Graphics Environment Operating System)*. Since *GEOS* frequently accesses the disk drive, the RAM disk's very high speed (about 1000 times faster than that of a floppy) makes *GEOS* much easier to use.

Memory expanders for the 128 can also be used as RAM disks, but not in all three of the computer's modes.

BASIC for beginners

The Power Of The ON Command

Larry Cotton

BASIC has a very useful command that can be used in conjunction with GOTO and GOSUB. That command is ON.

If you've been writing simple BASIC programs incorporating the statements we've discussed in this column, you may have encountered situations where you need to test for several conditions and take appropriate actions. Take a look at the following example:

```
100 INPUT "NUMBER FROM 1 TO 3"; A
110 IF A=1 THEN GOSUB 500
120 IF A=2 THEN GOSUB 600
130 IF A=3 THEN GOSUB 700
```

We've seen both INPUT and IF/THEN before. Lines 500, 600, and 700 would contain the subroutines which would perform different actions depending on the value typed for A—1, 2, or 3. Here's a way to accomplish the same thing in only two lines:

```
100 INPUT "NUMBER FROM 1 TO 3"; A
110 ON A GOSUB 500, 600, 700
```

That's all there is to it. Again, lines 500, 600, and 700 would contain the subroutines corresponding to the values of A.

How does ON work? First, look at the line numbers following the GOSUB; they are in positions one, two, and three. The number of positions usually correlates with the highest value of A that we expect the user to type. In this case, we're asking for a 1, 2, or 3. Therefore, there are three corresponding line numbers following the GOSUB.

If the user types a 1, ON uses that value to choose which number to go to—in this case line 500. Similarly, if the user types a 2 or a 3, control of the program is sent to line 600 or 700, respectively.

ON with GOTO

GOTO as well as GOSUB can be used with ON. Type in and RUN this program:

```
100 INPUT "NUMBER FROM TWO TO
    FIVE"; A
110 ON A GOTO 100, 120, 130, 140, 150
120 PRINT "TWO": END
130 PRINT "THREE": END
140 PRINT "FOUR": END
150 PRINT "FIVE": END
```

You're expected to enter a number in the range 2–5. Program control will be transferred to lines 120–150, which are in positions 2–5 after the GOTO. Try entering values in this range and observe the results.

Next, type in some values outside the requested range, including 1 and negative values. The table shows what happens for each possible number, and why.

No. typed	Program response	Why?
negative	ILLEGAL QUANTITY	ON cannot handle negative numbers (but see below)
0	Prints TWO	ON statement is ignored when zero is typed in
1	Asks again	Control is sent to line number in the first position after GOTO—line 100
2–5	Prints TWO—FIVE	Control is sent to the line numbers in the second through fifth positions after GOTO— lines 120 through 150
6–255	Prints TWO	ON statement is ignored when values exceed the number of entries after GOTO
256	ILLEGAL QUANTITY	Maximum value ON can handle is 255 or more

Here is a summary of the guidelines for using ON:

- Line numbers must be separated by commas (spaces optional).
- Any legal numeric expression may follow ON. Examples: X, N+3, X(3), GR*2−1.
- All the rules for GOTO and GOSUB (see last month) apply when they are used with ON.
- If the destination line for the GOTO or GOSUB doesn't exist, you'll get the error message UNDEF'D STATEMENT ERROR IN *line number*.
- The number of lines to which program control may be transferred usually corresponds to the highest value that the expression may become.
- If the expression evaluates to zero or a value greater than the number of positions after the GOTO or GOSUB, the ON is ignored.
- The maximum number of positions after GOTO or GOSUB is 255, but you can't actually type 255 different line numbers because of the 80-character limit of a Commodore 64 BASIC line or the 160-character limit of Commodore 128 BASIC.
- If negative numbers or numbers greater than 255 are used with ON, you'll get the error message ILLEGAL QUANTITY.
- If the numeric expression following ON is not an integer, the decimal portion is dropped. For instance, in the example programs above, if the user types 3.25 at the prompt, it will be treated as 3.

ON with Negative Numbers

Suppose you want ON to handle negative input. An example might be:

```
100 INPUT "ENTER A NUMBER FROM
    −3 TO −1"; N
110 ON N+4 GOTO 120, 130, 140
120 PRINT "MINUS THREE": END
130 PRINT "MINUS TWO": END
140 PRINT "MINUS ONE": END
```

Here's a chance to really use the old gray matter. ON has the capability of doing some simple (or even very complicated) math before it decides to which line number it should transfer control. In the above example, 4 is added to the number that is input (which should be in the range −3 to −1). This brings the input number into the range 1 to 3—a range that ON can handle.

Here's what happens: If you

type a −3 at the prompt, N becomes −3 and N+4 becomes +1 (−3+4=+1). +1 causes control to be sent to line 120, which prints the message "MINUS THREE".

Similarly, if you type a −1 at the prompt, N+4 becomes three and control is sent to the line number in the third position—140.

It's good programming practice to limit the responses to an INPUT, even if it's not being used with ON-GOTO or ON-GOSUB, so we'll use two IF/THEN statements to test for legal INPUT values, as shown in lines 110 and 120 below:

```
100 INPUT "NUMBER FROM ONE TO
    THREE";H
110 IF H<1 THEN 100
120 IF H>3 THEN 100
130 ON H GOTO 140, 150, 160
140 (program continues here)
```

If values outside of the requested range are entered, control returns to the INPUT statement in line 100.

ON's Other Uses

Of course, there are other ways to use ON (which is *always* used with GOSUB or GOTO) other than following INPUT statements. One of the most popular is with the RND (random) function, where programs can branch in random directions. We'll discuss RND in a future column.

Another use for ON is with the FOR-NEXT statement.

```
100 FOR T=1 TO 4
110 ON T GOSUB 200, 300, 400, 500
120 NEXT
130 END
200 (subroutine followed by RETURN)
300 (subroutine followed by RETURN)
400 (subroutine followed by RETURN)
500 (subroutine followed by RETURN)
```

This is useful for sequentially executing several subroutines, which can set up the screen or sound chip in the computer, define constants, gather the user's input, and so on.

To understand how ON is used with FOR-NEXT, type in this program:

```
100 PRINT "{CLR}{DOWN}HOW
    MANY STATES WOULD YOU LIKE
    TO SEE?"
110 PRINT
120 PRINT "1. NC ONLY"
130 PRINT "2. NC AND SC"
140 PRINT "3. NC, SC, AND VA"
150 PRINT: INPUT "YOUR CHOICE"; C
160 IF C<1 THEN 100: REM LOWER
    LIMIT
170 IF C>3 THEN 100: REM UPPER
    LIMIT
180 FOR T=1 TO C: ON T GOSUB 200,
    300, 400
190 NEXT:END
200 PRINT
210 PRINT "CAPITAL OF NC:
    RALEIGH"
220 RETURN
300 PRINT "CAPITAL OF SC:
    COLUMBIA"
310 RETURN
400 PRINT "CAPITAL OF VA:
    RICHMOND"
410 RETURN
```

Run this program three times, each time making a different choice, and observe the results. Remember: C is the user's response to the question, and T is the counter in the FOR-NEXT loop. When you type 2, for instance, C is given that value, and the program loops twice.

Lines 100–150 should be clear. Lines 160 and 170 limit the user's response. Please be careful to note that in line 180, ON is followed by T (the FOR-NEXT counter), *not* C (the user's input—the high limit for the counter). Lines 200–410 contain the subroutines.

Next month we'll look at the GET statement. In the meantime, try using ON in your own programs.

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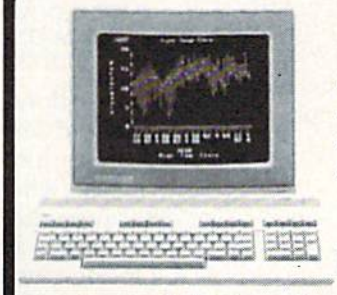

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machine language for beginners

Building Trampolines

Richard Mansfield
Editorial Director

It's something of an oddity that you cannot branch further than 127 bytes forward or 128 bytes backward, whereas you can JSR or JMP as far as you want. You can give the JMP instruction an address anywhere within the 64K range of the Commodore 64 or within the 64K size of any memory bank within the Commodore 128. A BEQ (Branch if EQual) command, however, is only allowed to leap within a zone which is 255 bytes large and which extends half that much in either direction from its own location within your program.

Before speculating about the possible reason for this curious state of affairs, let's first review the uses of the branching instructions. Essentially, commands such as BEQ and BNE (Branch Not Equal) are ML's way of handling IF-THEN and ON-GOTO structures. The branching commands respond to whatever has just happened in your program and either send the program to a new location, or not:

```
        LDA 12000
        BEQ CONT
        CMP #1
        BEQ UP
        CMP #2
        BEQ DOWN
CONT go on with the program
```

This program fragment could come from a larger program which is testing the byte at memory address 12000 to see what it contains and then is making a decision about it. If 12000 holds a zero, we jump to the location within our program called CONT and simply proceed with the program. If, however, address 12000 contains a 1, we branch to a routine called UP. UP has to be somewhere nearby since branches must be within that 255-byte-large zone. If 12000 contains a 2, we go to the subroutine labelled DOWN.

No Cause For Concern

The programmer, however, need not worry that the targets (CONTINUE, UP, and DOWN in our example above) of branch commands are, in fact, within the bounds, within the 255-byte limit. All reasonable assemblers will detect any such problems and report BRANCH OUT OF RANGE. It's usually relatively simple to correct the problem by moving things around a little.

Once in a while, though, you'll *need* to branch some distance from a branching instruction. One such dilemma arises when there's just no easy way to correct a BRANCH OUT OF RANGE error. In these cases, you can simulate a far branch by inserting a JMP as the target of a branch, like this:

```
        LDA 12000
        BEQ CONT
        CMP #1
        BEQ UP
        CMP #2
        BEQ DOWN
CONT    JSR MAIN
DOWN    JMP DOWN1
```

What we've done is create a "trampoline" and labelled it DOWN. Now we can locate the subroutine DOWN1 anywhere in 64K of memory because the JMP instruction uses a two-byte address. So, if there is a 2 in the byte at address 12000, we branch to DOWN, but DOWN can bounce us anywhere we need to go. This might seem a bit indirect, but it's pretty simple to program. The reason we have to go through this indirection is that the JMP instruction cannot make decisions and the branching instructions cannot go very far.

A Massive Structure

If you are planning a massive ON-GOTO structure, for example if you are branching to many places within your program as the result of a user's choice from a large menu, you might want to set up a series of JMPs in this way:

```
        LDA CHOICE
        BEQ CHOOSE
        CMP #1
        BEQ ONE
        CMP #2
        BEQ TWO
        CMP #3
        BEQ THREE
ONE     JMP ONE1
TWO     JMP TWO1
THREE   JMP THREE1
```

In this example there is a nearby subroutine, called CHOOSE, which continually tests to see if the user has indicated his or her preference from your program's menu of choices. This CHOOSE subroutine either leaves a zero (if there has been no choice yet) or the number associated with one of the items on the menu. If there is no choice yet, we branch up to CHOOSE and try again. If a choice has been made, we branch down onto one of our waiting trampolines, and we're off to the correct subroutine.

By the way, we don't have any hard information on why branching was limited to short distances, but we can make a reasonable assumption that it had to do with memory conservation. Far branching would require *two-byte addresses*. In the early days of personal computers (back, say, six years) when the 6502, the granddaddy of the 6500 family of microprocessers, was designed, computers had only 8K or less of RAM within which to write programs. Since branching is such a common event and since short-distance branching is usually all that's needed, it was felt that the savings in memory usage achieved with one-byte branch addressing was worthwhile. When you've got only 8K, every byte counts. More recent microprocessors, such as the 68000, feature "far branch" instructions which, with respect to their reach, are identical to jump and go-sub commands.

Easy ML Line Drawing

Paul Carlson

Drawing lines on the 128 with machine language is a lot easier than you might think. And it's much faster than with BASIC. As an example of the effects possible, an excellent demonstration program is included.

The 128's BASIC 7.0 has all the graphics commands that the 64 lacked. These commands are also available to machine language (ML) programs. In this article I'll show you how to use the line-drawing routine. Even if you're not interested in ML programming, you might be interested in typing in the program—it's an enhanced version of the classic "walking lines" demo program.

The line-drawing routine is among the easiest of the BASIC 7.0 ROM routines to use. Even if you're just beginning to program in machine language, you shouldn't have much trouble using it.

The line-drawing routine has a jump table entry at address $AF72 (a $ means that the number is in hexadecimal). The routine gets the color source and the starting and ending coordinates for the line from the following memory locations in RAM (all coordinates are in standard low-byte/high-byte form):

$0083	color source
$1131–$1132	starting *x* coordinate
$1133–$1134	starting *y* coordinate
$1135–$1136	ending *x* coordinate
$1137–$1138	ending *y* coordinate

When the line-drawing routine is called, the values in these memory locations determine the color and location of the line. After the routine has drawn a line, it moves the values from the ending coordinate addresses to the starting coordinate addresses. This makes it easy to draw connected lines—after the first line is drawn, only the new ending point needs to be loaded. As an example, the following routine draws a line from (10,20) to (150,80) with color source 1, and then draws to (40,120) with color source 2.

```
LDA   #$00     ;set high bytes of
STA   $1132    ; starting
STA   $1134    ; and ending
STA   $1136    ; coordinates
STA   $1138    ; to zero.
LDA   #$0A     ;load 10 ($A) into
STA   $1131    ; starting x.
LDA   #$14     ;load 20 into
STA   $1133    ; starting y.
LDA   #$96     ;load 150 into
STA   $1135    ; ending x.
LDA   #$50     ;load 80 into
STA   $1137    ; ending y.
LDA   #$01     ;load 1 into
STA   $83      ; color source.
JSR   $AF72    ;draw first line
LDA   #$28     ;load 40 into
STA   $1135    ; ending x.
LDA   #$78     ;load 120 into
STA   $1137    ; ending y.
LDA   #$02     ;load 2 into
STA   $83      ; color source.
JSR   $AF72    ;draw second line
RTS            ;return.
```

Although the graphics mode can be set using machine language, it's best to use the BASIC GRAPHIC statement, which initializes certain memory locations used by the line-drawing routine. Likewise, it's best to use the BASIC COLOR statement to define the color sources. The routine above assumes that the multicolor mode has been set and color sources 1 and 2 have been defined by the BASIC program that calls the routine.

Why bother with machine language at all, when the BASIC DRAW statement can do the same thing? The reason is *speed*. BASIC may not be fast enough when many lines need to be displayed in a short time. The program accompanying this article demonstrates the speed possible when a machine language routine is used.

Walking Lines

Type in "Walking Line Demo." Since it contains a machine language program in DATA statements which must be typed accurately, use "The Automatic Proofreader," found elsewhere in this issue, to enter the program. Be sure to save a copy of the program before running it.

After you've saved a copy, load and run the program. You'll see a bundle of lines walking across the screen. Press any key to stop the demo.

See program listing on page 104.

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Alphabetizing

Todd Heimarck
Assistant Editor

Computers are great at alphabetizing—they don't make mistakes and they don't complain about how boring the job is.

This month we'll take a look at two sorting algorithms: the bubble sort and the Shell sort. (Shell is capitalized, by the way, because it's named after Donald Shell, its inventor.) Both sorts, including the demonstration programs here, apply to any Commodore computer.

Four Rules

Sorting programs work in a variety of ways, but they all have four things in common. The first rule is that the items to be put in order, whether they're strings or numbers, must be in an array. At the beginning of the program, use the DIM command to set the dimension of the array. If the list has room for 50 items and is called B$, you'll put **DIM B$(50)** in one of the first lines. To find a single element in the array, use a number or a numeric variable in parentheses after B$. The 26th item on the list will be B$(26). If you're sorting numbers—batting averages, for example—use a numeric array such as B(X).

The second rule is that you have to initialize the values in the array. Like all other variables on the 64 or 128, newly created arrays are empty. Numeric arrays start out filled with zeros; string arrays begin as a collection of null strings (strings that contain nothing, with a length of zero). To initialize the array, you could type in the values yourself. Or you could put the values in DATA statements and READ them into the array. Or you could store them in a disk file and initialize the array by reading the file. The example programs set up the array by selecting characters at random.

Third, you need a way to compare two items in the list, to see if they're in the right order. In BASIC, you use the greater than (>) and less than (<) operators, which work on both numeric and string variables. The heart of a sorting routine is the section where the computer loops through the list to find out which items are incorrectly placed.

Finally, if two strings or numbers are in the wrong order, you have to switch them with a line like this: **T$=A$: A$=B$: B$=T$.**

The Bubble Sort

For short lists, a bubble sort is adequate. In terms of speed, however, it's not a good choice, as we'll see later. For explaining how a sort works, the bubble sort is excellent because it's short.

Let's say you have an array of ten strings. The following three lines will put the array in partial order:

```
10 FOR J = 1 TO 9
20 IF N$(J) > N$(J+1) THEN T$=N$(J):
   N$(J)=N$(J+1):N$(J+1)=T$
30 NEXT
```

The FOR-NEXT loop counts from 1 to one less than the size of the array (9, in this example). The variable J is the counter for the loop and an index to the array. The IF-THEN in line 20 compares one member of the array to its neighbor on the list. As J counts from 1 to 9, N$(1) is compared to N$(2), then N$(2) is compared to N$(3), and so on until the final pass through the loop, where N$(9) is compared to N$(10). This covers the final two items in the array, and it's why the loop counts up to 9, when the array size is really 10.

If two strings are out of order, they're swapped. Now let's say N$(2) equals *ZELDA* and it's alphabetically the last string on the list. The first comparison leaves N$(1) and N$(2) in place. The second comparison switches 2 and 3 (now N$(3) is *ZELDA*). The third moves our string down to N$(4), and so on. When the loop has finished, N$(10) holds *ZELDA*. We can't predict whether any of the first nine strings are in order, but we know that the last item in the array is correct.

Each time the loop is repeated, one more item falls into place. Eventually, the list will be sorted. The main bubble sort routine is found in lines 120–180 below. The outer loop starting at line 120 counts backwards from 79 to 78 to 77, down to 1. The inner loop counts from 1 to M—1 to 79, then 1 to 78, 1 to 77, and so on.

Since we know that the first pass puts the last element in place, it's not necessary to check it in the later loops. The second pass puts the penultimate string (number 79) in its place, so it doesn't need to be checked anymore.

Bubble Sort

```
RK 10 Z=80:DIM C$(Z):M=RND(-10
      0)
BB 20 FOR M=1TOZ:L=INT(RND(1)*
      6+3)
AJ 30 FOR N=1TOL:C$(M)=C$(M)+C
      HR$(INT(RND(1)*26+65)):N
      EXT:PRINTC$(M),
AM 40 NEXT:PRINT CHR$(147);
KC 50 GOSUB100:GOSUB100
GH 60 GETA$:IFA$=""THEN60
QD 70 END
AC 100 PRINT"SORTING"
MS 110 M=FRE(0):TI$="000000":C
       P=0:SW=0
FC 120 FOR M=(Z-1)TO1STEP-1
SE 130 FOR N=1TOM:CP=CP+1
XP 140 IF C$(N)<C$(N+1) THEN17
       0
GK 150 SW=SW+1
HE 160 T$=C$(N):C$(N)=C$(N+1):
       C$(N+1)=T$
SQ 170 NEXT
MR 180 NEXT
KM 190 PRINT TI;"JIFFIES",CP;"
       COMPARISONS"
CH 200 PRINT SW;"SWAPS"
GQ 210 FOR M=1TOZ:PRINTC$(M),:
       NEXT:PRINT
CD 220 RETURN
```

Line 140 compares two strings. If they're in place, the program skips ahead to line 170. The CP variable in 130 and SW in 150 aren't really necessary. They're

there to keep track of how many comparisons and swaps are made.

A Modified Bubble

Examine line 50 in the program above and you'll see that the bubble sort routine is called twice. The first time, the list is in random order. The second time, the array is in order. If you run the program, the program makes 3160 comparisons before it finishes (the number of comparisons is predictable: Take the length of the list, 80; multiply by the next number down, 79; and divide that number by 2). The first sort takes 4387 jiffies (73.12 seconds; a jiffy is 1/60 second). The second sort, when the list is already in order, takes 2610 jiffies (43.5 seconds). Both times there are 3160 comparisons.

The program can be modified to make it run faster when the list is sorted (or mostly sorted):

Modified Bubble Sort

```
RK 10  Z=80:DIM C$(Z):M=RND(-10
       0)
BB 20  FOR M=1TOZ:L=INT(RND(1)*
       6+3)
AJ 30  FOR N=1TOL:C$(M)=C$(M)+C
       HR$(INT(RND(1)*26+65)):N
       EXT:PRINTC$(M),
AM 40  NEXT:PRINT CHR$(147);
KC 50  GOSUB100:GOSUB100
GH 60  GETA$:IFA$=""THEN60
QD 70  END
AC 100 PRINT"SORTING"
MS 110 M=FRE(0):TI$="000000":C
       P=0:SW=0
HF 120 FOR M=(Z-1)TO1STEP-1:F=
       0
SE 130 FOR N=1TOM:CP=CP+1
XP 140 IF C$(N)<C$(N+1) THEN17
       0
XD 150 SW=SW+1:F=1
HE 160 T$=C$(N):C$(N)=C$(N+1):
       C$(N+1)=T$
JA 170 NEXT:IF F=0THENM=0
MR 180 NEXT
KM 190 PRINT TI;"JIFFIES",CP;"
       COMPARISONS"
CH 200 PRINT SW;"SWAPS"
GQ 210 FOR M=1TOZ:PRINTC$(M),:
       NEXT:PRINT
CD 220 RETURN
```

The variable F has been added to lines 120, 150, and 170. It acts as a flag that indicates whether or not a swap has occurred during each pass of the outer loop. Obviously, if no swaps have been made, the list is in order and no more sorting is needed. If F is still zero after the inner loop finishes, the sort routine ends. Now the scrambled list requires 3139 comparisons instead of 3160 and the sorted list needs 79 instead of 3160.

The Shell Sort

As the size of the list grows larger, bubble sorts become very slow. Run one of the bubble sort programs above and note the time. On a 128 in 64 mode, the first program took 4387 jiffies (73.12 seconds). Now change the first part of line 10 to read Z=160. That doubles the size of the list. Run the program again and it takes 18,649 jiffies (310.82 seconds). The list has doubled in size, but the time used by the sort program has quadrupled.

Here's an improved sorting program (lines 10–70 are the same):

Shell Sort

```
RK 10  Z=80:DIM C$(Z):M=RND(-10
       0)
BB 20  FOR M=1TOZ:L=INT(RND(1)*
       6+3)
AJ 30  FOR N=1TOL:C$(M)=C$(M)+C
       HR$(INT(RND(1)*26+65)):N
       EXT:PRINTC$(M),
AM 40  NEXT:PRINT CHR$(147);
KC 50  GOSUB100:GOSUB100
GH 60  GETA$:IFA$=""THEN60
QD 70  END
GC 100 PRINT"SORTING":GP=Z
MS 110 M=FRE(0):TI$="000000":C
       P=0:SW=0
JK 120 GP=INT(GP/2):IFGP=0THEN
       200
HB 130 F=0
KR 140 FOR M=1TO(Z-GP):CP=CP+1
CM 150 IF C$(M)<C$(M+GP)THEN17
       0
XB 160 T$=C$(M):C$(M)=C$(M+GP)
       :C$(M+GP)=T$:SW=SW+1:F=
       1
SQ 170 NEXT
KS 180 IF F THEN130
SS 190 GOTO120
AP 200 PRINT TI;"JIFFIES",CP;"
       COMPARISONS"
GE 210 PRINT SW;"SWAPS"
MR 220 FOR M=1TOZ:PRINTC$(M),:
       NEXT:PRINT
GE 230 RETURN
```

The Shell sort uses a gap (the variable GP) that's initialized to half the size of the list. For an 80-element array, GP would start at 40. Instead of comparing neighboring strings, you compare strings that are separated by 40. The first time through the main loop, C$(1) is compared to C$(41), C$(2) is compared to C$(42), and so on. When no more swaps can be made, the gap is cut in half and rounded down to 20, then 10, 5, 2, and 1.

The advantage to using the gap is that it helps strings move faster and farther. Let's use the *ZELDA* string as an example again. In a bubble sort of 80 strings, it takes 79 swaps to move *ZELDA* from the top of the list to the bottom, a time-consuming process. The Shell sort moves it 40, then 20, then 10. After only three comparisons, the wayward string has moved a total of 70 spots on the list.

How much faster is a Shell sort? Consider the following times:

	80 strings	160 strings
Bubble	**4387 jiffies**	**18,649 jiffies**
Shell	**1860 jiffies**	**5001 jiffies**

Doubling the size quadruples the time for a bubble sort, but it only multiplies the Shell sort time by about 2.7. The longer the list to be sorted, the better the Shell sort performs, as compared to the bubble sort.

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64/128 Sprite Printer

Mitchell Ross

To look at a sprite shape, you can PEEK into memory. But it takes a long time to convert the numbers into spots on graph paper. Here's how to let the computer do the work.

First you have to know where the sprite is located in memory. On the 64 and 128, you can PEEK locations 2040–2047 to find the pointers for the eight sprites. (For sprites used on the 128's hi-res screens, GRAPHIC 1–4, substitute 8184–8191.) For example, if you have a 128, PRINT PEEK(2040) should return the number 56. That's the pointer to the first sprite. Multiply the number by 64; that tells you where the 63 bytes of the sprite shape are located in memory. In this case, sprite zero is found at 56*64, or 3584.

The 64 doesn't have an area of memory reserved for sprites, but I often use the area starting at 12288 in my programs. Once you know where the sprite is, run this short program:

```
5 OPEN1,3
10 SL=12288
20 FORJ=SLTOSL+60STEP3:A$=""
30 FORK=JTOJ+2:M=128:SB=PEEK(K
   )
40 FORL=1TO8
50 IF SBANDM THENA$=A$+"*":GOT
   O70
60 A$=A$+CHR$(32)
70 M=M/2
80 NEXTL:NEXTK:PRINT#1,A$
90 NEXTJ
```

It's written for a sprite that starts at 12288. For other memory locations, just change the value of SL in line 10. The sprite shape prints on the screen (in line 5, device 3 is the screen). If you own a printer, you can print out the shape by changing the first line to OPEN 1,4. You must also close the printer channel by adding PRINT#1: CLOSE1 as a final line.

Instant 128 Help Screens

Anders Frankel

Here's a time- and memory-saving technique for people who own a 128 (or a 64 with a machine language monitor). Screen memory on both computers starts at 1024. If you have an introductory screen for a game or a series of help screens, you could put the information for one screen in a series of 25 PRINT statements. But if you have six pages of text, you'd need 150 PRINT lines. The following idea will allow you to banish all those PRINT statements from a program.

On the 128, go into the monitor by typing MONITOR. Clear the screen and type whatever you like to create the screen you want. When the screen looks right, cursor down to the second-to-the-last line and type **S *"filename"*, 08, 400, 800** and screen memory will be saved to disk. This same idea can be used by 64 owners who have *Micromon*, *Supermon*, or some other ML monitor.

The line with the filename will be saved along with the main screen. To avoid seeing that line, you can write a short BASIC program (128 mode only) that sets up the screen and then executes **BSAVE *"filename"*,B0,P1024 TO P2023**.

Once the screen is on disk, you can BLOAD it back into memory on the 128. On the 64, you'll have to use a line like this at the beginning of the program:

```
IF A=0 THEN A=1:LOAD "SCREEN1"
  ,8,1
```

If you have a 128 memory expander, the screens can be STASHed in expansion memory, then FETCHed for nearly instant access.

Turbo-Plus/4

Robert G. Boomers

Although the VIC, 64, 16, Plus/4, and 128 all have an internal clock speed of 1 MHz (one million cycles per second), they don't run BASIC programs at the same speed. In fact, if you time a FOR–NEXT loop that counts to 10,000, you'll find that the VIC-20 is the fastest Commodore computer, followed in order by the 64, the Plus/4 and 16, and the 128. Put the 128 in FAST mode (2 MHz), and it jumps to number 1 on the list. Does this mean Plus/4 owners are doomed to remain in last place on the list of who's hot and who's not? Not necessarily.

It's not very well known, but the speed of the Plus/4 and 16 can be increased tremendously by turning off the screen. **POKE 65286,11** turns it off and **POKE 65286,27** turns it back on. The increase in speed is roughly 30–40 percent, quite an improvement in programs that do lots of calculations (sorts, for example). It doesn't speed up the clock—it just frees the Plus/4 from having to update the screen.

With the screen turned off, suddenly the Plus/4 and 16 jump out in front of the VIC and 64. Only the 128 in FAST mode is faster than a Plus/4 with a blank screen.

If you're writing programs for others to use, they may be disconcerted to see the screen suddenly disappear. Also, if you're developing a program and it stops with an error, you won't see the error message because of the empty screen.

Since the screen blanks to the same color as the border, you can indicate that the program is still running by changing the border color occasionally while the screen is disabled. Insert a few COLOR 4,*x* lines in your program, where *x* is a number in the range 1–16. Both the border and the blank screen will change to the color you've chosen, and you'll be able to tell that the program is working.

No-SYS Loader

Walter L. Smith, Jr.

Now machine language programs can be as easy to handle as BASIC programs. With this 64 utility, running, loading, and saving most machine language programs is a snap. A disk drive is required.

Machine language (ML) programs are more difficult to load, run, and copy than their BASIC counterparts. "No-SYS Loader" narrows the gap between the two, allowing most ML programs to be treated like BASIC programs.

No-SYS Loader works by combining the ML program with a short BASIC loader to produce a new program that can be loaded, saved, and run like a BASIC program. When the program is run, the loader transfers the ML to its correct location, performs a NEW, and, if necessary, resets certain BASIC pointers.

Typing It In

No-SYS Loader is written in machine language. It must be entered using the "MLX" machine language entry program found elsewhere in this issue. When you run MLX, you'll be asked for the starting and ending addresses of the data you'll be entering. For No-SYS Loader, respond with the following values:

Starting address: 0801
Ending address: 0A88

After entering the data, be sure to save a copy of the program.

As an example of using No-SYS Loader, let's convert the game "Powerball" from this issue to BASIC loader form. First, load No-SYS Loader and type RUN. The program asks for a filename. Make sure that a disk containing a copy of the Powerball program is in the drive; then type POWERBALL (or whatever name you used to save that program). No-SYS Loader finds the file on disk and tells you its load address. In the case of Powerball, this address is 49152.

No-SYS Loader next asks for the SYS address that starts the program. For Powerball, type 49152. Or, since the load address and SYS address are the same, you may simply press RETURN instead of typing the address.

No-SYS Loader now gives you the opportunity to insert a remark into the program. For Powerball, you may want to type *May 1987 Gazette* so you'll know where to find instructions for the game. *Be sure that the remark you enter contains no more than 19 characters.* The program doesn't check the length of your input, and if you enter too many characters, the resulting program will crash when run.

Now insert the disk on which you want the converted program saved. Enter the filename for the converted file. Let's assume you type POWERBALL. The converted program is saved to disk.

To make sure that the program is working correctly, enter these lines:

```
LOAD"POWERBALL",8
LIST
```

You should see these lines on the screen:

```
10 SYS2088
20 REM your comment
```

The SYS address will always be 2088. This is the address of the loader, not the ML program. Run the program to see if it works properly.

Now that the program has been converted, it's easy to make copies. For example, to make a copy of Powerball, type

```
LOAD"POWERBALL",8
```

Then change disks (if desired) and type

```
SAVE"NEW NAME",8
```

Notes

A limitation of this program is that it will not convert programs that load below address 2304 ($0900). You'll find, however, that there are few ML programs that load below this address.

If the converted program is to be used as a utility for a BASIC program, the converted program must be loaded and run first, or else it will erase any BASIC program currently in memory. An example is "Fill-64" from the November issue.

See program listing on page 100.

Dazzlers

Paul Carlson

The most impressive screen displays on the Commodore 64 are done with high-resolution graphics. But you'll be surprised at what can be done in low resolution. These short programs demonstrate some eye-dazzling kaleidoscopic displays—using just the text screen.

When most people think of computer graphics, they think of high-resolution drawings and video games. "Dazzlers" should change that. Although the resolution is very coarse—the same as that of a text screen—the flowing colors and simulated movements are fascinating to watch.

Program 1 is the main program for Dazzlers. It POKEs a machine language program into memory and prepares the screen for the Dazzler routine. Five sample subroutines are included to help get you started.

Typing It In

To begin, type in Program 1—the Dazzler main program. Be sure to type the program in accurately since it contains a machine language program in the DATA statements. This program will not run without a subroutine beginning at line 100, but if you save a copy now, it will be easy to generate complete Dazzler programs. Save the program with a statement like this:

```
SAVE"DAZZLER MAIN",8
```
(tape users substitute ,1)

Now, when you want to write a Dazzler, load the main program and type in a subroutine. As an example, let's use Program 2 (Subroutine 1). First, load the main program with this line:

```
LOAD"DAZZLER MAIN",8
```
(tape users substitute ,1)

Then, with the Dazzler main program in memory, type in Program 2. When you've finished, save the complete Dazzler program with a line like this:

```
SAVE"DAZZLER 1",8
```
(tape users substitute ,1)

Now, you may load and run the completed Dazzler program.

More Dazzlers

Programs 3, 4, 5, and 6 contain alternative subroutines for Dazzler. By following the above procedure with each of these programs, you'll have five different Dazzler programs.

You can create your own displays by altering the subroutines provided. Dazzlers work by POKEing different colors into color memory. When you write your own Dazzlers, be sure to POKE only values in the range 0–15 into locations 55296–56319. For example, POKE 55301,12 is valid; POKE 55219,17 is not. In addition to POKEing to color memory in your subroutine, you may also print text to the screen. In this way you can create your own colorful, personalized messages.

The colors cascade across the screen in this graphics teaser—one of five different patterns included.

The Engine

For those who may be interested in the machine language program (Program 1), we have included the source code listing as Program 7. You don't need to type this in—the object code is included as DATA statements in the Dazzler main program.

See program listings on page 104.

Fast Boot

Jim Allen

Once you're used to the speed and efficiency of autobooting programs on the 128, it's a disappointment when you return to work in 64 mode. This clever utility offers a solution. A disk drive, either 1541 or 1571, is required.

Normally, the 128's autoboot feature is unavailable in 64 mode. "Fast Boot" lets you insert a disk in the drive, turn on the computer, and, within a matter of seconds, have a 64 program appear on the screen. If you have a 1571, Fast Boot also allows for loads up to five times faster than standard 64 mode loads. Since some games and utilities consist of more than one program, Fast Boot allows you to load as many as three programs at once.

Typing It In

First, type in Program 1, "Fast Boot ML Maker," and save it with the filename FASTBOOT M/L PRG. Be sure to use the "Automatic Proofreader" program located elsewhere in this issue to insure accurate entry. After typing it in and saving a copy, type RUN. Program 1 writes four machine language files to the disk for use by Program 2. After the ML files are created, you shouldn't need to run Program 1 again.

Next, type in Program 2, "Fast Boot." This program should be saved on the same disk with the ML programs created by Program 1. Be particularly careful when entering lines 0–9. These lines must be typed *exactly* as they are printed in the listing. Don't renumber Program 2 or add or delete any REM statements.

When you're ready to use Fast Boot, be sure that the drive is turned on and that it contains a disk with Program 2 and the ML files created by Program 1. Then load and run Fast Boot (Program 2). Fast Boot will load the ML files, then ask you to put the program disk in the drive. At this point, you should remove the disk containing Program 2 and insert the disk which contains the Commodore 64 program or programs that you'd like to have autobooted on the 128. (Fast Boot works *only* with Commodore 64 programs.) When you're ready, press the space bar to continue.

Fast Boot asks if you'd like a directory listing of the disk. Press Y to see a listing. Next, you're asked for the number of programs to autoload. This can range from 1 to 3. You must then give the filename of each 64 program that you want autoloaded. For each one, you must describe the program as BASIC or BINARY (for BASIC and machine language programs, respectively), and LOAD (to load the program only) or RUN (to load and run it). For machine language programs that load and run the same as BASIC—*SpeedScript*, for example—you must choose the BASIC option rather than the BINARY option.

Fast Boot will then prompt you for a new disk, the disk to be made autobooting. Remove the program disk and put the new disk in the drive. You can use a blank (unformatted) disk if you wish; Fast Boot will offer you the option of formatting the new disk.

Several files are written to the new disk. When Fast Boot ends, the new disk should be set up to autoboot the specified program or programs. Test the autoboot disk by turning the 128 off, and then back on. Your 64 program should load automatically, and also run if you specified the RUN option.

Notes

BASIC programs load higher in memory when the computer is in 128 mode, so conflicts are possible when more than one program is being loaded. For instance, the 64 version of *SpeedScript* can be autobooted, but you cannot use Fast Boot to autoboot *SpeedScript* and also load a *SpeedScript* text file.

Do not attempt to load or run BASIC programs that were not saved from 64 mode or from a Commodore 64. If you have a program that works in both 64 and 128 mode, be sure that you save the program from 64 mode before attempting to make it autoboot.

See program listings on page 95.

Gameports: Joystick, Paddle, And Mouse

Jim Butterfield

In this article, Jim Butterfield discusses how Commodore 128 and 64 game controller ports work, and he looks at the input devices that run through these ports. Also included are programs that test the ports and input devices.

The game controller ports of the Commodore 64 and 128 are quite versatile. To them, we can connect joysticks, paddles, mice, light pens, and other devices such as graphics tablets.

Unfortunately, these devices sometimes fail; and occasionally the circuitry within the computer stops working. It's useful to be able to check the system out. The programs given here allow you to test the ports as well as devices connected to the ports. They may also help you see how to go about your own programming of these devices.

Two Main Devices

There are two principal types of interface through the controller ports: *digital* and *analog*. The digital interface sends only on/off signals—it's often called a *joystick* interface, since the joystick is the most commonly used device of this type. The analog, or proportional, interface sends a continuously variable signal—it's often called a *paddle* interface, since game paddles are the most common devices of this kind. You'll also hear the analog connection called a *potentiometer* (or *pot*) interface. That's an electronics term—most of us know a potentiometer as the volume control on a radio. Paddles usually have *fire buttons*, which are on/off in nature, so the paddle interface has some digital input as well as analog.

A third type of interface is available on port 1 of the Commodore 64 and 128: the light pen. This is quite different from the joystick and paddle interfaces in that the light pen reading is calculated from the precise timing of the signal it sends to the computer. We won't deal with light pen operations here.

The joystick is the best-known peripheral device that connects to the game controller port. As we've mentioned, it's a digital device, sending on/off signals. The five possible signals from a joystick are up, down, left, right, and fire. Combinations are possible, so that we could simultaneously send down and left, or a three-way combination such as up, right, and fire. It would be an unusual joystick system that allowed sending simultaneous up and down signals, but from a technical standpoint even these apparently contradictory signals would be clearly understood by the computer.

You may occasionally hear of a *proportional* type of joystick. This is the type of joystick used with Apple II and IBM computers. This device sends an *analog* signal; instead of simple up or down, it sends continuously variable horizontal and vertical position values. Proportional joysticks are read like paddles, through the analog portion of the port. This type of interface is used in such devices as the MicroFlyte interface for *Flight Simulator II*, which gives more of the feeling of continuous control that a real aircraft joystick would provide.

The paddle was common with some of the first video games. Tennis-type games, where each of two players would need to position a bat on the screen to keep a ball in play, almost invariably used paddles. They are still around, although joystick-oriented games have overtaken them in popularity.

Newer Interfaces

Since the introduction of the joystick and paddle, newer devices have come into use. These use the same digital and analog interfaces—a program picks up their signals in the same way. Some of these devices are versions of the earlier interfaces; for example, a trackball is an alternative to a joystick. Others change the nature of the user interface—although a graphics tablet uses the same connections as a pair of paddles, it will be put to a completely different use.

The *trackball* is a ball set into a freely rotating mounting so that it can be rotated easily in any direction. Its effect is the same as that of a joystick; it signals direction digitally. Roll it to the right, and the joystick port will detect a right signal until movement stops. Note that there's no speed indication—the computer sees the same signal whether the ball is moving quickly or slowly. Trackballs cost more than joysticks, but usually last longer; and they can be used for more precise control in such applications as drawing with a joystick.

The *graphics tablet* has many physical implementations. In general, it allows you to indicate a screen position by pressing a pointer against a selected location on a rectangular board called a *tablet*. The pointer might be an electrically or mechanically interfaced device. On some tablets, your finger could do the job (with less accuracy). Although the tablet is physically separated from the screen, most users find that good hand/eye coordination (hand on tablet, eye on screen) is helpful when sketching or selecting an area of the screen. Typically, the paddle interface connections are used to send horizontal and vertical position coordinates to the computer.

The Mouse

The mouse is easy to recognize. It's a small rectangular device with two or three buttons, and it rolls across the table or a special mat. Technically, mouse operation varies widely.

A mouse such as the Commodore 1350, which sends only directional signals, is not a true mouse. The computer knows the direction of travel, but not the speed. In effect, the mouse is an upside-down trackball, and can be read the way a joystick is read. As such, it does some jobs well, and others poorly.

A true mouse is more than a joystick; it must somehow give both direction and speed to the computer (either that, or position, which amounts to the same thing). Some mice operate on an *interrupt* principle: Every time the mouse moves a certain distance, it sends a signal to the computer that it has done so. The processor interrupts whatever it is doing to log the mouse's movement, and then returns to its previous work. If the mouse is moved quickly, the processor services more interrupts—if slowly, fewer interrupts. In either case, the processor knows exactly where the mouse is at all times, and can track the movement regardless of speed.

The Commodore 1351

The new Commodore 1351 mouse has a built-in processor. When it's being used as a true, proportional mouse (and you may select this as an option), it calculates its position based on observed movement. It then reports its position to the computer. This is a useful way of doing things, since you get true mouse operation with no interrupt load on the computer.

When used in this way, the 1351 has a special problem which needs to be recognized by the computer. Its position reports (both horizontal and vertical) can go over the edge. Suppose I move the mouse right until its horizontal position reading is reported as the maximum value. What happens if I move the mouse still further right? You've probably guessed that the position reading wraps around to its lowest value, and then starts moving up again. The computer needs to understand this behavior so that going over the edge isn't mistaken for a large movement in the opposite direction.

The position reported by the 1351 covers a range of 128 possible values in both the horizontal and vertical dimensions. Since a PEEK of the paddle ports gives a number from 0 to 255, Commodore suggests you eliminate the high bit of the reading; you'd do this with the AND function. The Commodore 64 statement to properly read the 1351 might read X=PEEK(54297) AND 127. On the Commodore 128, you'd use X=POT(1) AND 127. Further, Commodore suggests that the lowest bit received from the 1351 be treated as jitter. To do this, replace the 127 above with 126. As a result of losing these bits, the 1351 supplies only 64 valid positions to the computer. This is not a serious limitation. By recognizing and tracking the wrap-around feature, a program could calculate thousands of coordinate positions.

If you just want to use the 1351 as a joystick, you may select this as an option at the time of computer power-up. Just hold down the right button of the mouse as you turn the power on, and it will become a non-proportional joystick-type device like the 1350. By the way, the 128's reset button won't do the job—the power supply to the 1351 must be turned off before it can reconfigure.

Problems

Joysticks can fail or turn erratic. Paddles can become "noisy" so that the readings they supply jump around randomly. Many programs try to cover for this by averaging readings received from paddles, but if the problem gets too bad, the interface is unusable. The computer's interface ports can fail. Damage to a chip can make the computer unable to detect the signals supplied by the device.

You may have seen warnings that you should never connect or disconnect a control port device while the computer's power is on. That's good advice, and is especially true of paddles and active devices that draw power, such as graphics tablets and most mouse devices.

Occasionally, changing a device seems to be unavoidable. For example, *GEOS 1.2* insists that you start by using a joystick, later giving you the option of switching to a different input device. It seems you are stuck with a live device change—to select the new input device you must use the old device (the joystick), then unplug the old and plug in the new. In the case of *GEOS*, the best solution is to upgrade to *GEOS 1.3*, which allows you to select the input device by means of the keyboard.

If live switching of a device seems unavoidable, check the connector. Some connectors are plastic on the outside, and others are metal-clad. Don't ever try to do a live switch with one of the metal-exterior connectors—you're almost sure to hit a couple of pins on the socket and cause damage to your computer's interface chip.

The Programs

The "Gameport Test" programs report what the computer sees—and if the computer doesn't see input from a device, either that device or the interface is bad. To find out which is at fault, switch ports or try another device.

Two versions of the Gameport Test program are provided: one for the Commodore 64 or Commodore 128 in 64 mode; the other for the Commodore 128 in 128 mode.

Connect the device or devices you wish to test; then turn on the computer and load the program. Exercise the device gently—the program's response is a little sluggish, and rapid motion might not be detected.

You may discover things you didn't know about these devices.

For example, most paddles have a "dead spot" where movement is not detected. Some joysticks are good at detecting diagonal movement (such as simultaneous up and left), and some are not so good. You might like to explore devices—for example, a graphics tablet that you may have used with a custom program—so you can get a better idea of how to use them in your own programs.

It's interesting that the 64 program doesn't work properly on the Commodore 128 in 128 mode. Even though all the PEEK locations are in the same place, the 128's interrupt structure is more active, so that the system is PEEKing the interfaces at the same time you are doing so. This causes confused readings.

By studying the program listing—written entirely in BASIC—you may get a better insight into how to write your own interface programs. The programs are good for device testing, and offer some insight into how the devices work.

See program listings on page 104.

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bug-swatter

• We have received a number of phone calls and letters concerning the "Pick-A-Letter" program (February 1987). Pick-A-Letter was originally written for the 128, but it will run on the 64 as written—almost. The most common report was that, after several consecutive games, the program stopped with an OUT OF MEMORY ERROR IN LINE 50 message. If you had this problem, you didn't actually run out of memory; you ran out of *stack* space. The stack is the special area of memory where information such as subroutine return addresses are stored. Pick-A-Letter uses a great many FOR-NEXT loops and GOSUBs, both of which eat up stack space quickly. To further compound the problem, the program jumps out of a few GOSUBs without removing the subroutine call information from the stack—not a good programming practice. Because the 128's BASIC stack is four times as large as the 64's, the problem doesn't appear nearly as soon on the 128. However, if you play Pick-A-Letter long enough on the 128, you'll eventually get the same OUT OF MEMORY message as on the 64. The following line corrections and additions fix the problem by exchanging several of the FOR-NEXT loops and GOSUBs with code that accomplishes the same thing without using stack space:

```
AG 10 BO=53280:AC=53281:SC=1024:
      S=54272:FORI=1TO40:SP$=SP$
      +" ":LF$=LF$+"{LEFT}":NEXT
BR 20 FORI=1TO25:DN$=DN$+"{DOWN}
      ":NEXT:FORI=1TO9:READH(I),
      L(I):NEXT
KD 90 FORH=1TO100:NEXT:GOTO50
XP 120 POKES,232:POKES+1,3:FORL=
       1TO100:NEXT:GOTO50
BE 520 PRINT"{39 O}";
AM 550 PRINT"{BLK}{39 U}";
QR 640 NV=0:NN=0:CD$=P$(P%(QQ)):
       CC=P(P%(QQ)):QQ=QQ+1:IFQQ
       >NWTHENQQ=1
PX 730 PRINT"{CYN}Q";:NV=NV+1
PM 760 PRINTLEFT$(SP$,30-LEN(CD$
       ));
BD 780 PRINT"{HOME}"LEFT$(DN$,17
       )TAB(22)"{8}{RVS}"CP
HG 840 IFZ$=" "THEN1040
KJ 930 PRINTLEFT$(LF$,20)K$:GOSU
       B1480:IFUR=1THEN1560
FD 940 GOTO 1180
CH 945 IFN=0THENB(CP)=1:GOTO770
DA 1060 POKES+24,15:POKES+5,128:
        POKES+6,32:POKES,64:POKE
        S+1,156:POKES+4,17
AJ 1065 POKE162,0:WAIT162,2:POKE
        S+4,16
FK 1130 IFV=65THEND=1:C(CP)=0:N=
        0:B(CP)=1:GOTO1250
KA 1140 IFV=88THEND=1:GOSUB70:GO
        SUB70:B(CP)=1:GOTO890
KR 1170 GOTO890
DK 1200 IFMID$(CD$,G,1)=K$THENN=
        N+1:GOSUB80:PRINTK$;:GOT
        O1215
CD 1215 NEXTG:C(CP)=C(CP)+PL*N:G
        OSUB1630
CH 1220 PRINT"{HOME}{4 DOWN}
        {RIGHT}"TAB(10*CP)"{8}
        {4 SPACES}{4 LEFT}"C(CP)
        ;
AP 1230 NN=NN+N:IFNN=NVTHENZX=1:
        GOTO1340
XA 1240 GOTO 945
QJ 1270 NN=NN+N:IFNN=NVTHENZX=1:
        GOTO1340
PM 1280 GOSUB100:GOTO890
CP 1290 PRINT"{HOME}"LEFT$(DN$,2
        1)LEFT$(SP$,39);
EQ 1300 PRINTLEFT$(LF$,39);:INPU
        T "ANSWER";A$
XD 1330 GOSUB70:PRINT"{HOME}
        {4 DOWN}{RIGHT}"TAB(10*C
        P)"{8}{4 SPACES}{4 LEFT}
        "C(CP);
AQ 1332 NN=NN+N:IFNN=NVTHENZX=1:
        GOTO1340
AH 1334 GOTO870
QM 1440 PRINTTAB(10)LEFT$(SP$,29
        );
ES 1500 G=1
BX 1505 IFK$=MID$(RL$,G,1)THENUR
        =1:RETURN
RS 1510 G=G+1:IFG<=RTHEN1505
MB 1530 G=1
FE 1535 IFK$=MID$(UL$,G,1)THENUP
        =1:RETURN
SG 1540 G=G+1:IFG<=UTHEN1535
JP 1560 PRINT"{HOME}"LEFT$(DN$,2
        1)LEFT$(SP$,39);
XD 1570 PRINTLEFT$(LF$,39);
JB 1610 PRINTLEFT$(LF$,25)"{8}
        {2 UP}";
SD 1660 PRINT"{HOME}"LEFT$(DN$,2
        3);
BQ 1690 PRINT"{HOME}"LEFT$(DN$,2
        3);
KB 1740 FORI5=1TO3:FORJ=1TO9:POK
        ES,L(J):POKES+1,H(J):NEX
        T:FORJ=9TO1STEP-1:NEXTJ,
        I5
AQ 1770 PRINT"{40 I}";
XR 1850 IFASC(PA$)=89THENPP=0:GO
        TO260
BQ 1860 PRINT"{CLR}":END
```

In addition to these changes, six lines should be deleted altogether: 60, 130, 140, 650, 660, and 670.

There is one other bug in Pick-A-Letter. As written, the program did not recognize when a word was completed if the word contained a hyphen (-) or an apostrophe ('). The corrections above also fix that problem.

BEFORE TYPING . . .

Before typing in programs, please refer to "How To Type In COMPUTE!'s GAZETTE Programs," which appears before the Program Listings.

Powerball

See instructions in article on page 46 before typing in.

```
C000:4C 65 C8 8D 03 24 8A 48 F8
C008:98 48 AE 03 24 BC 5B CB 84
C010:A9 00 99 04 D4 BD 54 CB EB
C018:99 05 D4 BD 62 CB 99 06 99
C020:D4 BD 69 CB D0 03 AD 1B 6E
C028:D4 99 01 D4 BD 70 CB 99 C8
C030:04 D4 49 01 99 04 D4 68 11
C038:A8 68 AA 60 A9 00 85 FC D8
C040:BD 3D 24 0A 0A 0A 85 FB 94
C048:0A 26 FC 0A 26 FC 18 65 53
C050:FB 85 FB A5 FC 69 00 85 1E
C058:FC A5 FB 18 7D 46 24 85 95
C060:FB 85 FD A9 04 65 FC 85 D0
C068:FC 18 69 D4 85 FE A0 00 52
C070:60 A9 00 8D 02 24 BD 46 C7
C078:24 30 15 CD 47 CD F0 26 11
C080:90 24 AD 47 CD 9D 46 24 13
C088:A9 FF 9D 35 24 4C 98 C0 2A
C090:A9 00 9D 46 24 9D 35 24 25
C098:A9 00 20 03 C0 BD 1D 24 7E
C0A0:20 96 C1 9D 1D 24 BD 3D 1C
C0A8:24 30 16 CD 46 CD 90 27 99
C0B0:EE 02 24 AD 46 CD 9D 3D 6B
C0B8:24 A9 00 9D 2D 24 4C C9 EC
C0C0:C0 A9 00 9D 3D 24 9D 2D C9
C0C8:24 A9 00 20 03 C0 BD 25 84
C0D0:24 20 96 C1 9D 25 24 AD D2
C0D8:02 24 60 20 7A C1 BD 67 30
C0E0:24 9D 3D 24 BD 5F 24 9D 17
C0E8:46 24 BD 57 24 9D 35 24 E9
C0F0:BD 4F 24 9D 2D 24 A9 02 D2
C0F8:4C 03 C0 B1 FB CD 4A CD 0E
C100:F0 08 8A 91 FB A9 00 91 80
C108:FD 60 AD 14 24 C9 07 D0 C0
C110:21 A9 20 91 FB B1 FD 29 77
C118:0F CD 48 CD D0 0A A9 02 80
C120:20 03 C0 A9 01 4C 8C C4 3E
C128:A9 01 20 03 C0 A9 03 4C F3
C130:68 C4 B1 FD 29 0F CD 48 98
C138:CD F0 A0 CD 49 CD F0 1F 52
C140:AD 49 CD 91 FD AD 1B D4 71
C148:30 08 29 0F C9 02 90 F5 69
C150:91 FD A9 01 20 8C C4 A9 C7
C158:01 20 03 C0 4C 7A C1 A9 4A
C160:20 91 FB A9 04 20 68 C4 A8
C168:AD 1B D4 C9 C0 B0 03 20 AF
C170:0E C3 A9 01 20 03 C0 4C 0C
C178:7A C1 BD 3D 24 DD 67 24 C0
C180:D0 0A BD 1D 24 20 96 C1 09
C188:9D 1D 24 60 BD 25 24 20 97
C190:96 C1 9D 25 24 60 49 FF 0B
C198:85 02 E6 02 A5 02 60 98 EA
C1A0:48 BC 1D 24 30 0D C8 CC 71
C1A8:40 CD B0 11 98 9D 1D 24 80
C1B0:4C BD C1 88 CC 41 CD 90 22
C1B8:04 98 9D 1D 24 68 A8 60 5E
C1C0:BD 1D 24 30 04 DE 1D 24 EB
C1C8:60 FE 1D 24 60 98 48 BC D4
C1D0:25 24 30 0D C8 CC 40 CD 8E
C1D8:B0 11 98 9D 25 24 4C EB 24
C1E0:C1 88 CC 41 CD 90 04 98 66
C1E8:9D 25 24 68 A8 60 BC 25 F4
C1F0:24 30 0A 88 C0 02 F0 0F 5B
C1F8:98 9D 25 24 60 C8 C0 FE BD
C200:F0 05 98 9D 25 24 60 60 07
C208:20 86 C2 F0 01 60 A9 20 A3
C210:91 FB AD 18 24 9D 15 24 7A
C218:F0 0E AD 44 24 9D 3D 24 C9
C220:DE 3D 24 A9 F0 9D 2D 24 FF
C228:A9 00 BD 25 24 30 03 20 94
C230:96 C1 9D 25 24 BD 1D 24 ED
C238:10 03 20 96 C1 9D 1D 24 D6
C240:AD 04 24 38 ED 05 24 10 81
C248:03 20 96 C1 8D 06 24 AD C0
C250:04 24 CD 05 24 F0 04 B0 88
C258:13 90 08 BD 35 24 CD 3C 7A
C260:24 B0 09 BD 1D 24 20 96 71
C268:C1 9D 1D 24 AD 06 24 CD B7
C270:72 24 B0 06 20 CD C1 4C B6
C278:C0 C1 CD 73 24 90 06 20 4F
C280:EE C1 4C 9F C1 60 BD 3D B9
C288:24 CD 44 24 F0 01 60 BD 68
C290:35 24 8D 06 24 AD 3C 24 40
C298:8D 07 24 BD 46 24 0E 06 EB
C2A0:24 2A 0E 06 24 2A 8D 04 CD
C2A8:24 AD 4D 24 0E 07 24 2A 96
C2B0:0E 07 24 2A 18 6D 75 24 AB
C2B8:8D 05 24 AD 05 24 38 ED BC
C2C0:04 24 10 03 20 96 C1 CD 30
C2C8:74 24 B0 03 A9 00 60 A9 8F
C2D0:01 60 A9 00 9D 3D 24 9D EB
C2D8:2D 24 AD 1B D4 CD 47 CD 9F
C2E0:B0 F8 9D 46 24 AD 1B D4 F7
C2E8:C9 E0 90 03 20 0E C3 AD 3C
C2F0:1B D4 29 0F CD 1C 24 B0 27
C2F8:F6 9D 25 24 FE 25 24 AD CA
C300:1B D4 29 1F 4A 90 03 20 1C
C308:96 C1 9D 1D 24 60 AD 12 E0
C310:24 10 01 60 8A 48 98 48 C2
C318:A9 00 8D 23 24 AD 42 CD 82
C320:4A 8D 2B 24 BD 46 24 8D B4
C328:4C 24 BD 3D 24 8D 43 24 6C
C330:A9 80 8D 3B 24 8D 33 24 F3
C338:8D 12 24 AD 1B D4 29 07 EF
C340:CD 13 24 F0 F6 AA AD 1B DF
C348:D4 DD 38 CD B0 ED 8E 13 03
C350:24 BD 30 CD 8D 2D D0 A5 A4
C358:FB 48 A5 FC 48 A9 E0 85 A4
C360:FB A9 CC 85 FC AD 13 24 2B
C368:0A 0A 0A 18 65 FB 85 FB 5C
C370:A5 FC 69 00 85 FC A0 00 98
C378:A2 28 B1 FB 9D 00 20 E8 67
C380:E8 E8 C8 C0 08 D0 F3 68 AF
C388:85 FC 68 85 FB 68 A8 68 B2
C390:AA 60 BD 46 24 9D 5F 24 1C
C398:BD 3D 24 9D 67 24 BD 35 29
C3A0:24 9D 57 24 BD 2D 24 9D 57
C3A8:4F 24 BD 1D 24 18 7D 35 1C
C3B0:24 9D 35 24 BD 1D 24 30 75
C3B8:0B BD 46 24 69 00 9D 46 0D
C3C0:24 4C CC C3 BD 46 24 E9 7C
C3C8:00 9D 46 24 BD 25 24 18 A5
C3D0:7D 2D 24 9D 2D 24 BD 25 5B
C3D8:24 30 0B BD 3D 24 69 00 09
C3E0:9D 3D 24 4C EE C3 BD 3D 0F
C3E8:24 E9 00 9D 3D 24 60 AD BF
C3F0:00 DC 8D 00 24 29 04 D0 FF
C3F8:09 AD 45 CD 8D 24 24 4C 87
C400:17 C4 AD 00 24 29 08 D0 A2
C408:09 AD 44 CD 8D 24 24 4C 78
C410:17 C4 A9 00 8D 24 24 AD 7E
C418:00 24 29 10 D0 2E A9 00 63
C420:8D 15 24 8D 16 24 8D 17 86
C428:24 AD 14 24 C9 04 D0 1C 10
C430:AE 4E CD BD 3D 24 10 0F E3
C438:AD 4D 24 9D 46 24 AD 44 AC
C440:24 9D 3D 24 DE 3D 24 CA 2C
C448:E0 07 D0 E7 A2 07 20 92 A0
C450:C3 AD 24 24 8D 00 24 20 C2
C458:71 C0 AD 24 24 CD 00 24 3F
C460:F0 05 A9 00 8D 24 24 60 7E
C468:CE 1A 24 D0 1F AD 1B 24 7B
C470:D0 17 8D 6F 24 AD 1C 24 05
C478:8D 02 24 A9 64 20 8C C4 E9
C480:CE 02 24 10 F6 EE 1C 24 47
C488:60 CE 1B 24 8D 00 24 8A DA
C490:48 98 48 A2 05 AD B0 07 DE
C498:18 6D 00 24 8D B0 07 A9 B2
C4A0:00 8D 01 24 BD AB 07 C9 64
C4A8:3A 90 0D EE 01 24 38 E9 F6
C4B0:0A C9 3A B0 F6 9D AB 07 90
C4B8:CA BD AB 07 18 6D 01 24 99
C4C0:9D AB 07 E0 FF D0 D8 68 50
C4C8:A8 68 AA 60 A2 08 AD 45 F1
C4D0:24 10 03 4C 37 C9 20 3C F2
C4D8:C0 A9 20 91 FB CE 45 24 14
C4E0:30 46 20 3C C0 B1 FB CD 6E
C4E8:4A CD F0 0B AD 4C CD 91 A5
C4F0:FB AD 4D CD 91 FD 60 A9 59
C4F8:FF 8D 45 24 B1 FD 29 0F B7
C500:CD 48 CD F0 23 CD 49 CD FD
C508:D0 0E A9 20 91 FB A9 01 87
C510:20 03 C0 A9 03 4C 68 C4 FD
C518:AD 1B D4 29 0F C9 02 90 A2
C520:F7 91 FD A9 06 4C 03 C0 8E
C528:A9 02 4C 03 C0 AD 43 24 2A
C530:10 03 4C 37 C9 A2 06 20 86
C538:92 C3 20 71 C0 F0 0B A9 A2
C540:00 8D 12 24 A9 FF 8D 43 5F
C548:24 60 20 86 C2 D0 03 4C 16
C550:8C C5 60 BD 46 24 8D 46 9F
C558:24 8D 47 24 8D 48 24 BD 18
C560:3D 24 8D 3D 24 8D 3E 24 11
C568:8D 3F 24 BD 1D 24 8D 1D 9C
C570:24 8D 1E 24 20 96 C1 8D E3
C578:1F 24 BD 25 24 8D 25 24 6C
C580:8D 27 24 20 96 C1 8D 26 20
C588:24 A9 00 60 8A 48 98 48 85
C590:A9 00 8D 12 24 A2 03 9D 13
C598:15 24 CA 10 FA AD 14 24 EC
C5A0:AA E0 02 D0 32 A9 00 8D CC
C5A8:75 24 4E 72 24 4E 73 24 4E
C5B0:4E 74 24 AD 3C 24 18 69 EB
C5B8:80 8D 3C 24 AD 4D 24 69 06
C5C0:01 8D 4D 24 A2 07 20 71 FE
C5C8:C0 A9 00 8D 24 24 AD 2F 34
C5D0:CD 2D 1D D0 8D 1D D0 A9 6B
C5D8:04 20 03 C0 AD 13 24 AA 87
C5E0:BD 30 CD 8D 2E D0 E0 00 60
C5E8:D0 24 A2 02 AD 42 CD BC 29
C5F0:25 24 10 03 AD 43 CD 9D FD
C5F8:25 24 AD 42 CD BC 1D 24 B9
C600:10 03 AD 43 CD 9D 1D 24 83
C608:CA 10 E1 4C C3 C6 E0 01 FB
C610:D0 16 A9 64 8D 18 24 4C 68
C618:C3 C6 A9 00 8D 15 24 8D 05
C620:16 24 8D 17 24 4C C3 C6 85
C628:E0 02 D0 35 AD 27 CD 0D C6
C630:1D D0 8D 1D D0 0E 72 24 CB
C638:0E 73 24 0E 74 24 A9 06 9C
C640:8D 75 24 AD 3C 24 38 E9 1E
C648:81 8D 3C 24 AD 4D 24 E9 98
C650:01 8D 4D 24 A2 07 20 71 90
C658:C0 A9 00 8D 24 24 4C C3 97
C660:C6 E0 03 D0 23 A2 00 BD 58
C668:3D 24 10 07 E8 BD 3D 24 EC
C670:10 01 E8 AD 4B CD C9 01 64
C678:F0 03 4C C3 C6 20 53 C5 28
C680:A9 03 8D 4B CD 4C C3 C6 F7
C688:E0 04 D0 03 4C C3 C6 E0 B1
C690:05 D0 15 AD 1C 24 C9 0A 61
C698:F0 0B A9 00 8D 6F 24 EE F7
C6A0:1C 24 4E 3D CD 4C C3 C6 D0
C6A8:E0 06 D0 13 AD A1 07 C9 3F
C6B0:39 F0 09 EE A1 07 4E 3E 2B
C6B8:CD 4C C3 C6 4C C3 C6 E0 05
C6C0:07 D0 00 A9 FF 8D 43 24 81
C6C8:AD 13 24 8D 14 24 68 A8 F9
C6D0:68 AA 60 A2 07 A0 0E BD 08
C6D8:3D 24 10 0C BD 28 CD 2D 28
C6E0:15 D0 8D 15 D0 4C 40 C7 30
C6E8:BD 20 CD 0D 15 D0 8D 15 04
C6F0:D0 BD 2D 24 8D 00 24 BD B0
C6F8:3D 24 0E 00 24 2A 0E 00 D5
C700:24 2A 0E 00 24 2A 69 29 B3
C708:99 01 D0 BD 35 24 8D 00 EF
C710:24 BD 46 24 0E 00 24 2A 0F
C718:0E 00 24 2A 18 69 07 8D D7
C720:01 24 0E 00 24 2A 99 00 F7
C728:D0 90 0C BD 20 CD 0D 10 04
C730:D0 8D 10 D0 4C 40 C7 BD 4B
C738:28 CD 2D 10 D0 8D 10 D0 A3
C740:88 88 CA 10 92 60 A2 02 ED
C748:CE 0A 24 D0 09 CE 0B 24 11
C750:AD 0C 24 8D 0A 24 BD 3D B0
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C758:24 30 06 20 81 C7 4C 64 F0
C760:C7 20 37 C9 CA 10 EF AD 83
C768:0B 24 10 09 4E 0D 24 AD B5
C770:0D 24 8D 0B 24 60 AD 1B 0B
C778:D4 10 03 4C 9F C1 4C CD 06
C780:C1 AD 0B 24 10 03 20 76 43
C788:C7 20 3C C0 B1 FB 8D 00 30
C790:24 EC 00 24 D0 04 A9 20 B9
C798:91 FB BD 15 24 F0 2F BD F9
C7A0:1D 24 48 BD 25 24 48 A9 A0
C7A8:00 9D 25 24 AD 24 24 9D 6A
C7B0:1D 24 20 92 C3 20 71 C0 47
C7B8:68 9D 25 24 68 9D 1D 24 E2
C7C0:CE 19 24 AD 19 24 29 03 0C
C7C8:D0 03 DE 15 24 60 20 92 24
C7D0:C3 20 71 C0 F0 09 A9 FF 83
C7D8:9D 3D 24 CE 4B CD 60 20 6A
C7E0:3C C0 20 FB C0 20 08 C2 DB
C7E8:60 A0 00 A2 05 BD 3D 24 B8
C7F0:10 03 20 D2 C2 20 92 C3 F9
C7F8:20 71 C0 F0 08 20 76 C7 91
C800:A9 05 20 03 C0 AD 1B D4 A3
C808:F0 16 C9 0F B0 12 9D 27 F1
C810:D0 FE F8 07 BD F8 07 C9 03
C818:86 D0 05 A9 83 9D F8 07 E7
C820:20 86 C2 F0 1B 20 3C C0 5D
C828:B1 FB CD 4C CD F0 11 C9 2E
C830:02 B0 1C 8E 00 24 AA 20 61
C838:7A C1 20 76 C7 AE 00 24 FF
C840:A9 03 20 03 C0 A9 FF 9D E5
C848:3D 24 A9 01 20 8C C4 CA 4E
C850:E0 02 D0 99 60 A9 CD 8D 59
C858:73 C9 A9 CB 8D 74 C9 A9 83
C860:01 8D 1C 24 60 A9 93 20 8C
C868:D2 FF 20 55 C8 20 B8 CA BF
C870:A9 0F 8D 86 02 A9 00 8D F8
C878:21 D0 A9 26 8D 00 24 A0 BB
C880:00 AE 46 CD E8 18 20 F0 3C
C888:FF A2 00 BD 83 CB 20 D2 FC
C890:FF E8 EC 00 24 D0 F4 20 68
C898:F9 CA 20 EF C3 20 46 C7 CF
C8A0:20 2D C5 20 E9 C7 20 CC C3
C8A8:C4 AD 8D 02 29 01 D0 F9 C2
C8B0:20 D3 C6 20 34 CB D0 E2 77
C8B8:A0 01 A2 0C 18 20 F0 FF 13
C8C0:A2 00 BD A9 CB 20 D2 FF 7A
C8C8:E8 E0 24 D0 F5 20 24 C9 DA
C8D0:AD 70 24 8D 73 C9 AD 71 42
C8D8:24 8D 74 C9 A9 30 8D 3D 71
C8E0:CD A5 A2 8D 08 24 CE 08 66
C8E8:24 A5 A2 CD 08 24 F0 09 E2
C8F0:AD 00 DC 29 10 F0 05 D0 A6
C8F8:F0 20 55 C8 A2 00 BD AB 7E
C900:07 DD B8 07 F0 04 90 14 E2
C908:B0 07 E8 E0 06 D0 EF F0 25
C910:0B A2 05 BD AB 07 9D B8 BB
C918:07 CA 10 F7 A9 1B 8D 00 38
C920:24 4C 7F C8 A5 A2 69 3C 1C
C928:8D 08 24 A5 A2 CD 08 24 E3
C930:D0 F9 A9 04 4C 03 C0 A9 B9
C938:DC 8D 08 24 EE 08 24 D0 91
C940:FB 60 A9 00 85 FB 85 FD 44
C948:8D 1A 24 8D 1B 24 A0 00 31
C950:A9 20 99 00 04 99 00 05 7F
C958:99 00 06 88 D0 F4 AD 73 2B
C960:C9 8D 70 24 AD 74 C9 8D EC
C968:71 24 A9 04 85 FC A9 D8 7F
C970:85 FE AD CD CB C9 03 90 35
C978:0F EE 73 C9 D0 03 EE 74 3F
C980:C9 20 98 C9 90 EC B0 0D 57
C988:C9 00 F0 09 EE 73 C9 D0 59
C990:03 EE 74 C9 60 4C 55 C8 34
C998:8D 00 24 29 03 AA 4E 00 69
C9A0:24 4E 00 24 E0 02 90 12 5E
C9A8:AD 1A 24 18 6D 00 24 8D E0
C9B0:1A 24 AD 1B 24 69 00 8D 16
C9B8:1B 24 BD 5F CD 91 FB BD FA
C9C0:63 CD 91 FD C8 D0 0B E6 12
C9C8:FC E6 FE A5 FC C9 07 90 7C
C9D0:01 60 CE 00 24 D0 E3 60 63
C9D8:A0 18 A9 00 99 00 D4 88 F6
C9E0:10 FA A9 0F 8D 18 D4 A2 7A
C9E8:07 A9 FF 8D 0F D4 A9 80 E2
C9F0:8D 12 D4 A2 07 BD 3D 24 62
C9F8:30 11 20 3C C0 B1 FB 8D 03
CA00:00 24 EC 00 24 D0 04 A9 52
CA08:20 91 FB CA 10 E7 AD 45 FE
CA10:24 30 10 A2 08 20 3C C0 E9
CA18:B1 FB CD 4C CD D0 04 A9 67
CA20:20 91 FB A9 FF 8D 14 24 C6
CA28:8D 45 24 8D 15 24 A9 FA BA
CA30:8D 0C 24 A9 30 8D 0D 24 A4
CA38:8D 0B 24 A2 07 BD 4F CD A1
CA40:9D F8 07 A9 FF 9D 3D 24 73
CA48:BD 57 CD 9D 27 D0 CA 10 48
CA50:EC AC 46 CD 88 8C 44 24 50
CA58:88 8C 3D 24 A9 01 8D 72 1E
CA60:24 A9 05 8D 73 24 A9 06 71
CA68:8D 74 24 A9 00 8D 75 24 46
CA70:8D 1D D0 AD 47 CD 4A 8D 9C
CA78:46 24 8D 4D 24 A9 00 8D 16
CA80:12 24 8D 18 24 8D 3C 24 4F
CA88:8D 35 24 8D 34 24 8D 24 01
CA90:24 8D 2C 24 A9 F0 8D 2D BC
CA98:24 A9 01 8D 4B CD AD 42 D2
CAA0:CD 18 6D 1C 24 8D 1D 24 48
CAA8:AD 43 CD 38 ED 1C 24 8D D8
CAB0:25 24 20 D3 C6 4C 24 C9 9C
CAB8:A2 00 A9 00 9D 00 20 9D 9F
CAC0:00 21 CA D0 F7 A9 FF A2 0E
CAC8:27 A0 00 9D 00 20 9D 40 EF
CAD0:20 E8 E0 40 D0 F5 A2 16 8A
CAD8:B9 78 CB 9D 80 20 AD 80 1D
CAE0:CB 9D C0 20 AD 81 CB 9D 86
CAE8:00 21 AD 82 CB 9D 40 21 1B
CAF0:E8 E8 E8 C8 C0 08 D0 E0 87
CAF8:60 A9 80 8D 3E CD A2 27 A7
CB00:BD 98 07 9D 76 24 CA 10 41
CB08:F7 A9 93 20 D2 FF A2 27 7D
CB10:BD 76 24 9D 98 07 AD 86 45
CB18:02 9D 98 DB CA 10 F1 A9 0D
CB20:01 8D 6F 24 A2 08 A9 FF 54
CB28:9D 3D 24 CA 10 F8 20 42 F5
CB30:C9 4C D8 C9 AD 6F 24 D0 BB
CB38:06 20 F9 CA 4C 51 CB AD B3
CB40:4B CD D0 0D CE A1 07 AD 94
CB48:A1 07 C9 30 F0 05 20 D8 63
CB50:C9 A9 01 60 D5 00 00 2A 36
CB58:A9 2A 41 07 07 07 00 00 3C
CB60:00 00 F3 F3 F3 03 00 03 64
CB68:03 0B 1E 46 0A 09 00 00 E0
CB70:11 11 11 80 20 10 10 10 70
CB78:00 00 1C 3E 3E 1C 00 00 D9
CB80:1F F8 10 20 50 41 44 44 3E
CB88:4C 45 53 20 34 20 20 20 86
CB90:53 43 4F 52 45 20 30 30 EC
CB98:30 30 30 30 20 20 48 49 B8
CBA0:47 48 20 30 30 30 30 30 C7
CBA8:30 50 52 45 53 53 20 46 79
CBB0:49 52 45 20 54 4F 20 43 8F
CBB8:4F 4E 54 49 4E 55 45 20 1D
CBC0:41 54 20 54 48 49 53 20 85
CBC8:4C 45 56 45 4C A0 F3 F3 B7
CBD0:A0 A3 A3 01 F0 53 3C 53 C6
CBD8:3C 53 3C 53 3C 53 50 A2 92
CBE0:01 A0 F3 F3 F3 F3 A4 99 31
CBE8:01 A0 F2 F2 A0 A2 A0 A2 2A
CBF0:A0 A2 01 A0 4B 10 93 10 7D
CBF8:93 10 93 10 4B 49 12 49 BE
CC00:01 A0 DF 11 0B 11 7B 11 F3
CC08:0B 11 DF 4F 09 EF 43 21 0C
CC10:87 19 E7 01 A0 A3 91 C0 38
CC18:A3 91 A0 A3 91 01 D8 32 AA
CC20:68 43 58 51 50 53 50 51 A0
CC28:5C 3A 01 A1 F2 F2 A1 F3 53
CC30:F3 A1 27 05 27 05 27 05 02
CC38:2B A1 01 50 05 9C 05 9C 36
CC40:05 08 05 74 05 14 05 07 CF
CC48:05 04 05 14 05 07 54 05 39
CC50:06 05 0C 11 04 05 14 05 22
CC58:13 48 05 06 05 08 09 0A F2
CC60:11 10 05 28 06 04 06 04 F9
CC68:06 18 1D 06 09 06 0D 0F 98
CC70:04 05 14 06 04 06 04 1A 8A
CC78:14 3D 0F 04 05 14 1E 04 46
CC80:0A 14 09 0F 11 0A 0D 17 18
CC88:05 14 0A 04 12 04 0A 14 F3
CC90:09 0F 11 0A 0D 17 05 14 18
CC98:0A 04 1E 08 0E 09 07 0E 2D
CCA0:0B 12 09 0E 0B 05 0E 08 D6
CCA8:FE 11 6A 05 06 05 06 05 F8
CCB0:06 05 0A 05 13 05 0A 05 E5
CCB8:06 05 06 05 06 05 42 05 75
CCC0:06 05 06 05 06 05 0A 05 0D
CCC8:13 05 0A 05 06 05 06 05 14
CCD0:06 05 66 05 13 05 8A 05 92
CCD8:13 05 8A 05 13 05 46 00 18
CCE0:C3 99 9F C3 F9 99 C3 FF B0
CCE8:C3 99 9F 9F 9F 99 C3 FF A3
CCF0:9F 9F 9F 9F 9F 9F 81 FF AE
CCF8:C3 99 F9 E3 F9 99 C3 FF 16
CD00:81 9F 9F 87 9F 9F 9F FF 6B
CD08:99 89 81 81 91 99 99 FF 41
CD10:FF 99 C3 00 C3 99 FF FF 0F
CD18:83 99 99 83 9F 9F 9F FF 02
CD20:01 02 04 08 10 20 40 80 BF
CD28:FE FD FB F7 EF DF BF 7F BF
CD30:07 05 06 0E 02 0A 0C 04 86
CD38:C0 FF FF FF FF 30 60 FF B5
CD40:23 DD 08 F8 2D D3 16 27 81
CD48:01 05 FA 01 1E 0F 09 82 D6
CD50:82 82 83 83 83 80 81 01 98
CD58:01 01 04 07 0D 01 01 20 34
CD60:FA FA FA 00 01 0C 05 00 D9
```

BEFORE TYPING . . .

Before typing in programs, please refer to "How To Type In COMPUTE!'s GAZETTE Programs," which appears before the Program Listings.

Unscramble

Article on page 44.

```
QE 10 POKE53281,0:POKE53280,6:
      CO=54272:SC=1024:NDX=198
      :REM NDX=208 ON THE 128
GA 20 POKECO+24,15:POKECO+5,17
      :POKECO+6,240:POKECO,100
FC 30 X=RND(-TI):DIMA$(40),B$(
      40),TE(40)
EP 40 FOR I=0 TO 9:READ NU$(I)
      :NEXT:DATA 00,01,02,03,0
      4,05,06,07,08,09
FE 50 FOR I=1 TO 5:READ FF$(I)
      :NEXT:DATA FIRST,SECOND,
      THIRD,FOURTH,FIFTH
BG 60 PRINT"{CLR}{YEL}":D$="
      {23 SPACES}"
EH 70 PRINTSPC(14)"{2 DOWN}{8}
      UNSCRAMBLE":PRINTSPC(14)
      "{10 T}"
JM 80 FOR I=0 TO 1:PRINT SPC(1
      1)"{3 DOWN}{7}PLAYER #"R
      IGHT$(NU$(I+1),1)"'S NAM
      E"
KK 90 PRINTSPC(11);:INPUT P$(I
      ):IF P$(I)="" THEN PRINT
      "{2 UP}":GOTO90
JA 100 P$(I)=LEFT$(P$(I),10):N
       EXT
KK 110 PRINT"{CLR}{DOWN}":POKE
       NDX,0:FOR I=1 TO 5:W$(I
       )="":NEXT
MC 120 PRINT"{3 SPACES}{RVS}
       {8}"P$(C)
EB 130 FOR I=1 TO 5
JE 140 PRINT"{DOWN}{3 SPACES}
       {YEL}ENTER {RVS}"FF$(I)
       "{OFF} WORD TO BE SCRAM
       BLED{OFF}"
BG 150 PRINT"{3 SPACES}";:INPU
       TW$(I):IFW$(I)=""THENPR
       INT"{UP}";:GOTO150
```

```
JA 160 W$(I)=LEFT$(W$(I),15):F
       ORP=1TOLEN(W$(I))
JM 170 IFMID$(W$(I),P,1)<"A"OR
       MID$(W$(I),P,1)>"Z"THEN
       P=LEN(W$(I)):NEXT:GOTO1
       40
HA 180 NEXT:NEXT:PRINT"
       {2 DOWN}{8}{9 SPACES}SC
       RAMBLING THE WORDS..."
XJ 190 GOSUB210:GOSUB330:GOSUB
       580
EM 200 FOR I=1 TO 10:B$(I)="":
       NEXT:GOTO110
KC 210 FOR I=1 TO 5:R$(I)="":N
       EXT:FOR MT=1 TO 5:UPS=L
       EN(W$(MT))
CA 220 FOR I=1 TO UPS:TE(I)=1:
       NEXT
XK 230 FOR I=1 TO UPS
BJ 240 XX=INT(UPS*RND(1))+1:IF
        TE(XX)=0 THEN240
BP 250 B$(I)=MID$(W$(MT),XX,1)
       :TE(XX)=0:NEXT:R$(MT)="
       "
JG 260 FOR I=1 TO UPS:R$(MT)=R
       $(MT)+B$(I)
DH 270 NEXT:IF R$(MT)=W$(MT) A
       ND LEN(W$(MT))>1 THEN22
       0
SD 280 NEXT
PE 290 PRINT"{CLR}{2 DOWN}{UP}
       {9 SPACES}WORDS ARE SCR
       AMBLED {DOWN}":QQ=-Q+1:
       SP=LEN(P$(QQ))+24:SP=SP
       /2
EG 300 PS=19-SP:PRINT SPC(PS)
       {SPACE}P$(QQ)", PRESS A
       NY KEY TO BEGIN{HOME}":
       GOSUB670
JG 310 POKENDX,0:WAITNDX,1:GET
       A$
CQ 320 PRINT"{CLR}":RETURN
KF 330 FOR MT=1 TO 5:CS=-C+1:S
       P=INT(LEN(P$(CS))/2)
MM 340 PS=19-SP:PRINT"{HOME}
       {6 DOWN}"SPC(11)D$"
       {DOWN}":PRINTSPC(11)D$:
       PRINTSPC(11)D$
DP 350 PRINT"{HOME}{2 DOWN}"SP
       C(PS)"{RVS}"P$(CS):SP=I
       NT(LEN(R$(MT))/2):PS=19
       -SP
DC 360 PRINT"{3 DOWN}{YEL}"SPC
       (PS) R$(MT)
GQ 370 FOR J=1 TO LEN(W$(MT)):
       A$(J)=MID$(W$(MT),J,1):
       NEXT
DQ 380 Z=SC+360+PS:CC=Z+CO:X=P
       S:FOR I=1 TO LEN(W$(MT)
       ):POKE Z,99:POKE CC,1
MJ 390 GET R$:TM=TM+.06:IF INT
       (TM)> 59 THEN MI=MI+1:T
       M=INT(TM)-60
QD 400 IF MI>9 THEN TT$=STR$(M
       I):MI$=RIGHT$(TT$,2):GO
       TO420
MB 410 MI$=NU$(MI)
QQ 420 IF TM>=10 THEN TT$=STR$
       (INT(TM)):TM$=RIGHT$(TT
       $,2):GOTO440
MQ 430 TM$=NU$(TM)
ED 440 PRINT"{HOME}{20 DOWN}"S
       PC(17)"{YEL}WORD"MT
RK 450 PRINT"{HOME}{8}"SPC(17)
       MI$":"TM$:IF R$="" THEN
       390
XJ 460 PRINT"{6 DOWN}"
SE 470 IF R$=A$(I) THEN PRINT
       {SPACE}TAB(X)A$(I);:PA=
       50:UPS=50:GOSUB660:GOTO
       490:STOP
RK 480 TM=TM+10:PA=20:UPS=120:
       GOSUB660:GOTO390
DP 490 Z=Z+1:X=X+1:CC=CC+1:NEX
       T:NEXT MT:PRINT:PRINT"
       {3 DOWN}":Q=-C+1
FC 500 SP=LEN(P$(Q))+19:SP=INT
       (SP/2):PS=19-SP
MF 510 PRINT SPC(PS)"{7}TOTAL
       {SPACE}TIME FOR {RVS}"P
       $(Q)"{OFF} WAS{DOWN}":S
       P=14:MI=VAL(MI$)
MA 520 PRINT SPC(SP);:IF MI>0
       {SPACE}THEN PRINT"
       {5 LEFT}" MI"MINUTE";
RD 530 IF MI>1 THEN PRINT"S";
XS 540 IF MI>0 THEN PRINT" AND
       ";
JC 550 TM=VAL(TM$):PRINT TM"SE
       COND";:IF TM>1 THEN PRI
       NT"S"
BP 560 PRINT"{HOME}{20 DOWN}"S
       PC(17)"{6 SPACES}"
JK 570 FOR I=1 TO 3000:NEXT:SO
       (Q)=MI*100+TM:SO$(Q)=MI
       $+":"+TM$:TM=0:MI=0:RET
       URN
CE 580 IFC<>1THENC=1:RETURN
DC 590 PRINT"{CLR}{5 DOWN}{8}
       {14 SPACES}FINAL SCORES
       ":PRINT SPC(14)"{12 T}
       {2 DOWN}"
EC 600 PRINTSPC(11)P$(0)TAB(23
       )SO$(0):PRINT"{2 DOWN}"
       SPC(11)P$(1)TAB(23)SO$(
       1)
KJ 610 PRINT"{2 DOWN}":WN$=P$(
       0):IF SO(0)=SO(1) THEN
       {SPACE}PRINT SPC(14)"IT
       'S{2 SPACES}A TIE":GOTO
       640
XE 620 IF SO(1)<SO(0) THEN WN$
       =P$(1)
RG 630 PRINT"{11 SPACES}{RVS}"
       WN$" IS THE WINNER
       {2 DOWN}"
GE 640 PRINT"{2 DOWN}
       {7 SPACES}PRESS ANY KEY
        TO PLAY AGAIN"
MG 650 WAITNDX,1:GETA$:RUN
CH 660 POKE CO+1,PA:POKE CO+4,
       33:FOR QQ=1 TO UPS:NEXT
       :POKE CO+4,32:RETURN
RC 670 FOR PA=40 TO 20 STEP-1:
       UPS=20:GOSUB660:NEXT:FO
       R I=1 TO 500:NEXT:RETUR
       N
```

Fast Boot

Article on page 89.

Program 1: Fast Boot ML Maker

```
EX 10 REM M/L PROGRAMS FOR FAS
      TBOOT-64
SF 30 :
MP 40 PRINT"{CLR}"TAB(81)"THIS
       PROGRAM WILL SAVE FOUR"
QX 50 PRINT" M/L PROGRAMS TO D
      ISK -- BE SURE"
EA 60 PRINT" THE DISK YOU USE
      {SPACE}IS THE SAME AS"
HS 70 PRINT" THE ONE WITH FAST
      BOOT-64!"
EE 80 PRINT:PRINT" HIT SPACE B
      AR TO CONTINUE"
DK 90 GETKEY ZZ$:IF ZZ$<>" " T
      HEN 90
CQ 100 AD=49152:EA=49178:GOSUB
       310
XD 110 READ DA:DA=DA/137:POKE
       {SPACE}AD,DA:AD=AD+1
GC 120 EA=49197:GOSUB 310
GC 130 READ DA:DA=DA/55:POKE A
       D,DA:AD=AD+1
AX 140 EA=49241:GOSUB 310
QF 150 PN$="FAST LOAD M/L":GOS
       UB 330
HP 160 :
CA 170 POKE 49179,137:POKE 491
       98,55:AD=49242
RR 180 RESTORE 510:EA=AD+38:GO
       SUB 310
FJ 190 PN$="FAST RUN M/L":GOSU
       B 330
AR 200 :
MA 210 RESTORE 570:AD=49171:EA
       =AD+61:GOSUB 310
XD 220 READ DA:DA=DA/203:POKE
       {SPACE}AD,DA:AD=AD+1
XM 230 EA=AD+17:GOSUB 310:READ
        DA:DA=DA/43:POKE AD,DA
       :AD=AD+1
HX 240 EA=AD+69:GOSUB 310:PN$=
       "FAST LOAD BASIC":GOSUB
        330
RA 250 :
FM 260 AD=49171+62:POKE AD,203
       :AD=AD+19:POKE AD,43
FM 270 AD=AD+71:EA=AD+23:RESTO
       RE 780:GOSUB 310
JJ 280 PN$="FAST RUN BASIC":GO
       SUB 330
SJ 290 END
ED 300 :
BP 310 DO UNTIL AD=EA+1:READ D
       A:POKE AD,DA:AD=AD+1:LO
       OP:RETURN
QE 320 :
QP 330 RESTORE 830:EA=EA+8:GOS
       UB 310
JX 340 BSAVE(PN$),B0,P49152 TO
        P(AD)
PQ 350 RETURN
QH 360 :
GA 370 DATA 169,3,141,48,208,1
       62,0,189
GH 380 DATA 144,1,157,0,128,23
       2,224,9
EG 390 DATA 208,245,169
XK 400 :
GG 410 DATA 48,133,95,169,4,13
       3,96,169
JM 420 DATA 13426,133,90,169,4
MP 430 DATA 133,91,169,144,133
       ,88,169,1
FG 440 DATA 133,89,32,191,163,
       76,5170,1
XJ 450 DATA 162,1,142,22,208,3
       2,163,253
QH 460 DATA 32,80,253,32,21,25
       3,32,91
CQ 470 DATA 255,88,32,83,228,3
       2,191,227
BD 480 DATA 32,34,228,162,251,
       154,173,153
PG 490 DATA 1,141,17,3,173,154
       ,1,141,18,3
FA 500 :
DS 510 DATA 169,83,141,119,2,1
       69
FE 520 DATA 89,141,120,2,169,8
       3,141,121
JB 530 DATA 2,169,55,141,122,
       ,169,56
FE 540 DATA 141,123,2,169,52,1
       41,124,2
PJ 550 DATA 169,13,141,125,2,1
       69,7,133,198
RE 560 :
XC 570 DATA 1,133,25,169,32
XF 580 DATA 133,26,169,1,133,2
       7,133,43
KK 590 DATA 169,8,133,44,133,2
       8,174,154
EM 600 DATA 1,240,16,160,0,177
       ,25,145
```

```
JR 610 DATA 27,200,208,249,230
       ,26,230,28
GX 620 DATA 202,208,242,174,15
       3,1,240,8
SH 630 DATA 177,25,145,27,200,
       202,208,248
KP 640 DATA 169,102,133,95,169
       ,4,133,96
DR 650 DATA 169,36337,133,90,1
       69,4,133,91
BD 660 DATA 169,144,133,88,169
       ,1,133,89
HM 670 DATA 32,191,163,76,2881
       ,1,162,1
QJ 680 DATA 142,22,208,32,163,
       253,32,80
AH 690 DATA 253,32,21,253,32,9
       1,255,88
FK 700 DATA 32,83,228,32,191,2
       27,173,1
KQ 710 DATA 8,141,144,1,173,2,
       8,141
BG 720 DATA 145,1,32,34,228,17
       3,144,1
HH 730 DATA 141,1,8,173,145,1,
       141,2
QX 740 DATA 8,162,251,154,24,1
       73,153,1
QF 750 DATA 101,43,133,45,173,
       154,1,101
ME 760 DATA 44,133,46
MB 770 :
RG 780 DATA 169,82,141,119,2
GX 790 DATA 169,85,141,120,2,1
       69,78,141
JM 800 DATA 121,2,169,13,141,1
       22,2,169
PQ 810 DATA 4,133,198
RE 820 :
GK 830 DATA 169,0,141,48,208,7
       6,116,164
```

Program 2: Fast Boot

```
EM 0 GOTO 260
PG 1 PN$(1)="0123456789ABCDEF"
     :LP(1)=12345:I=1
JD 2 PN$(2)="0123456789ABCDEF"
     :LP(2)=12345:I=2
JJ 3 PN$(3)="0123456789ABCDEF"
     :LP(3)=12345:I=3
JH 4 DATA 0,4,102,254,195,194,
     205,56,48,123,123
SE 5 IF PEEK(215)<>0 THEN PRIN
     T:PRINT"{TOP}SWITCH TO 40
      COLUMN MONITOR!!":GRAPHI
     C 0
EH 6 FAST:FOR J=1 TO I:BLOAD(P
     N$(J)),B0,P(LP(J)):NEXT
XS 7 BLOAD"LOADER ROUTINE",B0,
     P1024:SE=400:PA=32768
BK 8 FOR I=0 TO 8:POKE SE+I,PE
     EK(PA+I):READ DA:POKE PA+
     I,DA:NEXT
DA 9 READ DA:POKE SE+I,DA:READ
      DA:POKE SE+10,DA:GO64
JE 10 :
RC 20 FOR I=1 TO 5:FAST:NI=NA(
     I):AI=AA(I):IF PN$(I)=""
      THEN BEGIN
FH 30 :IF I<4 THEN DI=DI+1:DL(
     DI)=I:NEXT I
DA 40 :BEND:GOTO 100
MD 50 BANK 1:SZ=PEEK(POINTER(P
     N$(I))):BANK 0:PRINT HH$
     ;PN$(I)
RK 60 FOR J=1024 TO J+SZ-1:PJ=
     PEEK(J):IF PJ<32 THEN PJ
     =PJ+64
HJ 70 POKE NI,PJ:NI=NI+1:NEXT
     {SPACE}J:POKE NI,34:IF S
     Z=16 THEN 100
DF 80 FOR H=NI+1 TO H+15-SZ:PO
     KE H,32:NEXT H
AM 90 :
FA 100 PRINT HH$;LP(I):K1=4:IF
      I>3 THEN K1=2:SLOW
BR 110 FOR K=1025 TO K+K1:POKE
      AI,PEEK(K):AI=AI+1:NEX
     T K:NEXT I
HJ 120 :
RC 130 FAST:POKE 842,48:POKE 8
     43,13:K=2:IF DI THEN BE
     GIN
QD 140 :FOR I=1 TO DI:POKE 842
     +K,ASC(MID$(STR$(DL(I))
     ,2,1))
GP 150 :BEND:K=K+1:POKE 842+K,
     13:K=K+1:NEXT I
EE 160 POKE 842+K,19:K=K+1:POK
     E 842+K,13:K=K+1:POKE 2
     08,K:AD=SB+420
DQ 170 :
GE 180 IF PEEK(AD)<>203 THEN A
     D=AD+1:GOTO 180
JF 190 AD=AD+1:IF PEEK(AD)<>0
     {SPACE}THEN 190
JS 200 FOR J=1 TO 2:AD=AD+1:PO
     KE AD,0:NEXT
FH 210 BQ=AD+1:POKE 4624,BQ AN
     D 255:POKE 4625,BQ/H1
JS 220 :
AM 230 PRINT HH$;"DSAVE";QT$;"
     AUTOEXEC.64";QT$
CB 240 COLOR 5,CC:SLOW:END
RA 250 :
CR 260 EC$=CHR$(27):QT$=CHR$(3
     4):DIM LA(11),EA(11):MT
     =63700:MS=49152
MS 270 HM=32768:H1=256:PN$="FA
     ST LOAD BASIC":BA=0:LA=
     MS:HH$="{2 HOME}{CLR}"
CB 280 IF RGR(X)<>0 THEN PRINT
     :PRINT"SWITCH TO 40 COL
     UMN MONITOR!!!":GRAPHIC
      0
CS 290 PRINT HH$;TAB(81)"STAND
      BY...":LA(0)=LA:GOSUB
     {SPACE}1040:EA(0)=EA
AX 300 LA=LA+H1:LA(1)=LA:PN$="
     FAST RUN BASIC":GOSUB 1
     040:EA(1)=EA
HP 310 LA=LA+H1:LA(10)=LA:PN$=
     "FAST LOAD M/L":GOSUB 1
     040:EA(10)=EA
PR 320 LA=LA+H1:LA(11)=LA:PN$=
     "FAST RUN M/L":GOSUB 10
     40:EA(11)=EA
BR 330 PN$="":PRINT"{CLR}":PRI
     NT:PRINT EC$+"T PLACE P
     ROGRAM DISK INTO DISK D
     RIVE."
MS 340 GOSUB 1070:PRINT"{CLR}
     {SPACE}DO YOU WANT THE
     {SPACE}DIRECTORY (Y/N)
     ":GOSUB 1200
AR 350 PRINT HH$;TAB(80);:IF Z
     Z$="Y" THEN TRAP 1240:O
     PEN 1,8,15,"U0>M0":DIRE
     CTORY:PRINT#1,"U0>M1":D
     CLOSE:PRINT:SLEEP 1:TRA
     P:PRINT TAB(160)"{4 UP}
     ";
SJ 360 PRINT EC$"T ENTER NUMBE
     R OF PROGRAMS (1,2 OR 3
     )."
KK 370 GETKEY NP$:NP=VAL(NP$):
     IF NP<1 OR NP>3 THEN 37
     0:ELSE IF NP=1 THEN 390
AF 380 :PRINT:PRINT" {RVS}REME
     MBER, BASIC PROGRAM MUS
     T BE FIRST"
PR 390 LA=2049:FOR X=1 TO NP:I
     F X>1 THEN BEGIN:PRINT:
     PRINT
JQ 400 :PRINT" THERE IS";MR;"B
     YTES REMAINING"
EF 410 :PRINT" (APPROX.";INT(M
     R/255+1);"DIRECTORY BLO
     CKS)"
MX 420 :BEND:PRINT" ...CONTINU
     E (Y/N)?":GOSUB 1200:IF
      ZZ$="N" THEN STOP
DQ 430 :
KF 440 PRINT:PRINT:PRINT"{UP}
     {SPACE}PROGRAM NAME:";:
     NL=16:GOSUB 1110:PN$(X)
     =PN$
PR 450 :
JR 460 DOPEN#2,(PN$):GOSUB 128
     0:GET#2,LB$,HB$:DCLOSE#
     2
DA 470 HB(X)=ASC(HB$):LB(X)=AS
     C(LB$):LP(X)=H1*HB(X)+L
     B(X)
FP 480 IF LP(X)<2049 THEN PRIN
     T"{2 HOME}{CLR}":PRINT"
      SORRY, CAN'T HANDLE PR
     OGRAMS THAT LOAD":PRINT
     "BELOW THE START OF BAS
     IC!":STOP
QG 490 BA=1:GOSUB 1040:BA=0:SZ
     =EA-LA:EP(X)=LP(X)+SZ:H
     A(X)=EA:IF X=1 THEN BEG
     IN
RJ 500 :LP(4)=(SZ-HM) AND 255:
     LP(5)=INT(SZ/H1)
KA 510 :
CA 520 :R$=CHR$(29):FOR I=1 TO
      8:RT$=RT$+R$:NEXT:FR$=
     RT$+R$+R$+R$
RC 530 :PRINT:PRINT:PRINT:PRIN
     T"(TOGGLE WITH SPACE BA
     R){2 UP}"EC$"J";
KG 540 :PRINT" BASIC:{RVS} *
     {OFF}{2 SPACES}BINARY:
     {RVS}{3 SPACES}{OFF}
     {4 SPACES}(RETURN)";
QP 550 :GOSUB 980:BI=F1*10:F1=
     0
CX 560 :PRINT:PRINT:PRINT
BF 570 :
XP 580 :PRINT:PRINT"{2 SPACES}
     LOAD:{RVS} * {OFF}
     {5 SPACES}RUN:{RVS}
     {3 SPACES}{OFF}
     {4 SPACES}(RETURN)";
AB 590 :GOSUB 980:RN=F1:LF=BI+
     RN
XB 600 :IF LF<2 THEN LP(1)=819
     3:EP(1)=LP(1)+SZ:GOTO 6
     20
SK 610 :BEND:LP(4)=LB(X):LP(5)
     =HB(X)
AX 620 LX(X)=LA:LA=EA+1:MR=MT-
     LA:NEXT
SJ 630 :
QE 640 IF NP=1 AND LF<2 THEN 6
     90:ELSE FOR X=1 TO NP:I
     F X=1 THEN 660
HB 650 IF LP(X)<EP(1) THEN PRI
     NT" OVERLAP ERROR PROGR
     AMS 1 AND";X;:STOP
SC 660 IF LP(X)<7600 THEN PRIN
     T" SORRY, CAN'T HANDLE
     {SPACE}M/L PROGRAMS
     {8 SPACES}THAT LOAD BEL
     OW DECIMAL 7600!":STOP
FP 670 NEXT
CQ 680 :
BX 690 GOSUB 1300:HD$=HN$
AR 692 PRINT HH$;TAB(81)"{RVS}
     PLACE NEW DISKETTE IN D
     ISK DRIVE.":GOSUB 1070
CB 695 GOSUB 1300:IF HN$=HD$ T
     HEN BEGIN
SH 696 :PRINT TAB(81)"YOU DIDN
     'T CHANGE DISKS!":PRINT
     " CONTINUE (Y/N)?";
```

```
DS 697 :GOSUB 1200:IF ZZ$="Y"
       {SPACE}THEN 692
JR 698 :BEND:STOP
QC 700 PRINT"{CLR}"TAB(81)"DOE
       S IT NEED FORMATTING (Y
       /N)?";
MG 710 GOSUB 1200:IF ZZ$="N"TH
       EN PRINT"{CLR}"TAB(80);
       EC$;"T":GOTO 800
CA 720 PRINT:PRINT:PRINT" DISK
        NAME:";:NL=16:GOSUB 11
       10:HD$=PN$
DK 730 PRINT TAB(28)"{UP}";:PR
       INT"ID:";:NL=2:GOSUB 11
       10
XH 740 IF LEN(PN$)=1 THEN PN$=
       PN$+" "
KQ 750 PRINT:PRINT:PRINT EC$;"
       T FORMATTING DISKETTE..
       ."
DK 760 OPEN15,8,15,"N0:"+HD$+"
       ,"+PN$:CLOSE 15
SG 770 IF DS=21 THEN PRINT:PRI
       NT" ID REQUIRED ON THIS
        DISK!":GOTO 720
BJ 780 GOSUB 1280
CD 790 :
BD 800 PRINT"{CLR} MAKING THIS
        A BOOT DISK..."
QP 810 Z$=CHR$(0):Z2$=Z$+Z$:AE
       $="AUTOEXEC.64"
GP 820 OPEN15,8,15:OPEN5,8,5,"
       #":PRINT#15,"B-P";5;0
RD 830 PRINT#5,"CBM"+Z2$+Z2$+A
       E$+Z2$+CHR$(162)+CHR$(2
       6);
AS 840 PRINT#5,CHR$(160)+CHR$(
       11)+CHR$(76)+CHR$(165)+
       CHR$(175);
GA 850 PRINT#5,"RUN"+CHR$(34)+
       AE$+Z$:PRINT#15,"U2";5;
       0;1;0
BH 860 PRINT#15,"B-A";0;1;0:DC
       LOSE:D$=DS$
BJ 870 :
GH 880 PRINT"{CLR} COPYING PRO
       GRAMS TO BOOT DISK..."
DF 890 FOR X=1 TO NP:BSAVE(PN$
       (X)),B1,P(LX(X)) TO P(H
       A(X))
BP 900 GOSUB 1280:NEXT X
EM 910 :
HP 920 BSAVE"LOADER ROUTINE",B
       0,P(LA(LF)) TO P(EA(LF)
       ):GOSUB 1280
EB 930 SB=PEEK(45)+H1*PEEK(46)
       :RESTORE 940
HJ 940 FOR I=1 TO 5:READ AA:AA
       (I)=SB+AA:NEXT:DATA 46,
       92,138,184,188
DS 950 FOR I=1 TO 3:READ AA:NA
       (I)=SB+AA:NEXT:DATA 22,
       68,114
QH 960 CC=RCLR(5):COLOR 5,RCLR
       (0):GOTO 20
QS 970 :
QB 980 PRINTCHR$(27)"J"+RT$;
JM 990 GETKEY KG$:IF KG$=CHR$(
       13) THEN RETURN
PX 1000 IF KG$<>" " THEN 990:E
       LSE IF F1 THEN 1020
GD 1010 PRINT"{RVS} "+FR$+"*";
       :F1=1:GOTO 980
JR 1020 PRINT"{RVS}*"+FR$+" ";
       :F1=0:GOTO 980
FB 1030 :
QP 1040 BLOAD(PN$),B(BA),P(LA)
       :EA=H1*PEEK(175)+PEEK(
       174):GOSUB 1280:RETURN
SD 1060 :
GM 1070 PRINT:PRINT" HIT SPACE
        BAR WHEN READY....."
GE 1090 GETKEY ZZ$:IF ZZ$<>CHR
       $(32) THEN 1090:ELSE R
       ETURN
GF 1100 :
EC 1110 PN$="":GK=0:PRINT"
       {RVS}";
CG 1130 FOR I=1 TO NL:PRINT" "
       ;:NEXT:FORI=1 TO NL:PR
       INT"{LEFT}";:NEXT
GB 1140 GETKEY KG$:IF KG$=CHR$
       (13) THEN 1180:ELSE IF
        KG$=CHR$(20) THEN PRI
       NT KG$+"{INST} {LEFT}"
       ;:GK=LEN(PN$)-1:PN$=LE
       FT$(PN$,GK):GOTO 1140
FP 1160 GK=GK+1:IF GK>NL THEN
       {SPACE}PRINT CHR$(7):G
       OTO 1140
HK 1170 PRINT KG$;:PN$=PN$+KG$
       :GOTO 1140
GG 1180 PRINT KG$;:RETURN
BQ 1190 :
MR 1200 GETKEY ZZ$:IF ZZ$="Y"
       {SPACE}THEN RETURN
QE 1220 IF ZZ$<>"N" THEN 1200:
       ELSE RETURN
KR 1230 :
BD 1240 IF ER=30 THEN RESUME N
       EXT
MQ 1260 PRINT ERR$(ER);EL:STOP
MB 1270 :
XB 1280 IF DS<20 THEN RETURN:E
       LSE PRINT"ERROR: ";DS$
       :DCLOSE:STOP
EC 1290 :
CA 1300 OPEN 15,8,15:OPEN 5,8,
       5,"#":PRINT#15,"U1";5;
       8;5;"#"
HX 1310 HN$="":PRINT#15,"B-P";
       5;144:FOR X=1 TO 20:GE
       T#5,L$:HN$=HN$+L$:NEXT
RS 1320 DCLOSE:RETURN
```

BEFORE TYPING . . .

Before typing in programs, please refer to "How To Type In COMPUTE!'s GAZETTE Programs," which appears before the Program Listings.

Cassette Sleeve Maker

Article on page 52.

```
RC 10 DIM SG$(2,19),TE$(19):RE
      M SET UP ARRAYS
RH 20 FORI=1TO2:FORJ=1TO19
QX 30 SG$(I,J)="{19 SPACES}"
GA 40 NEXTJ:NEXTI
SQ 50 SET$="+----------------
      ----------------------+
      "
GX 60 AX$="------------------
      ":ZX$="{18 SPACES}"
SD 70 FM$="A":FC$="B"
AE 80 PRINT"{CLR}{3 DOWN}
      {10 RIGHT}{RVS}CASSETTE
      {SPACE}SLEEVE MAKER{OFF}
      "
HB 90 PRINT"{5 DOWN}{8 RIGHT}E
      NTER THE NUMBER OF SIDES
      "
QG 100 PRINT"{DOWN}{8 RIGHT}YO
       U WISH TO LABEL (1/2)";
RJ 110 INPUTC:IFC<>1ANDC<>2THE
       N110
XJ 120 AT=C
SS 130 PRINT"{CLR}{4 DOWN}
       {9 RIGHT}THE NEXT SCREE
       N WILL"
QJ 140 PRINT"{DOWN}{7 RIGHT}SH
       OW HALF OF A TAPE LABEL
       "
CR 150 PRINT"{4 DOWN}{5 RIGHT}
       ENTERED LINES MAY {RVS}
       NOT{OFF} CONTAIN:"
AG 160 PRINT"{4 DOWN}{8 RIGHT}
       {RVS}; OR , OR <, OR +,
        OR ↑"
HK 170 PRINT"{6 DOWN}{8 RIGHT}
       HIT ANY KEY TO CONTINUE
       "
JJ 180 GETS$:IFS$=""THEN180
RX 190 REM{2 SPACES}*MAIN PROG
       RAM*
XX 200 FORI=1TOC
CB 210 FORJ=1TO19
DR 220 GOSUB700:GOSUB1020
DA 230 GOSUB650
QP 240 PRINT"{HOME}{DOWN}":FOR
       R=1TOJ
JK 250 IFR=15ORR=17THENPRINT"
       {DOWN}{UP}"
HE 260 PRINT"{2 RIGHT}";SG$(I,
       R)
AP 270 NEXTR
AF 280 GOSUB910
JX 290 IFJ>15THENPRINT"{DOWN}
       {UP}"
EF 300 GOSUB1170:INPUTC$
FM 310 IFLEFT$(C$,1)=CHR$(94)A
       NDJ<15THENJ=15:GOTO220
PM 320 SG$(I,J)=C$
AK 330 GOSUB910:SG$(I,J)=LEFT$
       (SG$(I,J),19)
AK 340 GOSUB1210
SB 350 BB$=SG$(I,J):GOSUB1110:
       SG$(I,J)=BB$
HG 360 PRINT"{HOME}{DOWN}":FOR
       IK=1TOJ:GOSUB1150
AD 370 IFIK=JTHENPRINT"{UP}"
JH 380 PRINT"{2 RIGHT}";SG$(I,
       IK):NEXTIK
HP 390 GOSUB1060:IFKS$<>"Y"AND
       KS$<>"N"THENPRINT"{UP}"
       :GOTO390
AJ 400 IFKS$="N"THENSG$(I,J)=Z
       X$:GOTO220
GX 410 NEXTJ
RA 420 NEXTI
BB 430 REM{5 SPACES}** HARD CO
       PY **
FB 440 PRINT"{CLR}{7 DOWN}
       {6 RIGHT}PRESS ANY KEY
       {SPACE}FOR PRINTOUT"
MD 450 GETA$:IFA$=""THEN450
JR 460 LB=2:LA=1:IFAT=1THENLA=
       1:LB=2
GQ 470 OPEN 4,4
KP 480 PRINT#4,SET$
CB 490 PRINT#4,"+ SIDE A
       {15 SPACES}SIDE B
       {12 SPACES}+"
ED 500 FORJ=1TO19
GP 510 TE$(J)="+ "+SG$(LA,J)+"
        "+SG$(LB,J)+"+":NEXTJ
SG 520 FORJ=1TO14:PRINT#4,TE$(
       J):NEXTJ
AR 530 PRINT#4,SET$
RR 540 PRINT#4,TE$(15):PRINT#4
       ,TE$(16)
JX 550 PRINT#4,SET$
EB 560 FORI=17TO19:PRINT#4,TE$
       (I):NEXTI
AS 570 PRINT#4,SET$
CB 580 CLOSE4
QH 590 PRINT"{CLR}{6 DOWN}WOUL
       D YOU LIKE ANOTHER LABE
       L (Y/N)";
JB 600 INPUTA$:IFA$<>"Y"ANDA$<
       >"N"THEN600
```

```
SX 610 IFA$="Y"THEN20
ES 620 PRINT"{CLR}":END
AD 630 REM{4 SPACES}*** SUBROU
       TINES ***
MD 640 REM{2 SPACES}---SUB POI
       NTER----
DM 650 GOSUB910
GB 660 GOSUB1180:IFJ>15THENPRI
       NT"{DOWN}{UP}"
DS 670 PRINTTAB(21)"←"
JA 680 RETURN
DQ 690 REM{2 SPACES}------SUB
       {SPACE}SETUP-----
GF 700 PRINT"{CLR}":IF I=2THEN
       810
FH 710 FD$=" +"+AX$
SX 720 PRINT" +{RVS}SIDE ";FM$
       ;"{13 SPACES}{OFF}"
AG 730 FORII=1TO14:PRINT" +":N
       EXTII
PB 740 PRINTFD$
HE 750 PRINT" +"
DH 760 PRINT" +"
HC 770 PRINTFD$
EJ 780 FORII=1TO3:PRINT" +":NE
       XTII
XF 790 PRINT FD$
SH 800 GOSUB970:RETURN
AQ 810 FD$="{2 SPACES}"+AX$+"+
       "
GC 820 PRINT" +{RVS}SIDE ";FC$
       ;"{13 SPACES}{OFF}+"
XG 830 FORII=1TO14:PRINTTAB(21
       )"+":NEXTII
AG 840 PRINTFD$
XC 850 PRINTTAB(21)"+"
DD 860 PRINTTAB(21)"+"
QJ 870 PRINTFD$
FC 880 FORII=1TO3:PRINTTAB(21)
       "+":NEXTII
PB 890 PRINTFD$:GOSUB970:RETUR
       N
XE 900 REM{2 SPACES}---- SUB C
       URSOR ----
AG 910 PRINT"{HOME}"
SS 920 FORD=1TOJ
FQ 930 PRINT"{DOWN}{UP}"
SA 940 NEXTD:PRINT"{UP}":RETUR
       N
ER 950 :
GG 960 REM{2 SPACES}---- SUB 1
       9 CHARACTERS ----
JM 970 PRINT"{HOME}"
XC 980 PRINTTAB(22)"←←←THIS IS
        19"
BB 990 PRINTTAB(25)"CHARACTERS
       "
XE 1000 PRINTTAB(25)"FOR REFER
        ENCE"
DS 1010 RETURN
PG 1020 PRINT"{HOME}"
DB 1030 PRINT"{12 DOWN}"TAB(23
        )"INPUT LINE #";J
DA 1040 RETURN
GC 1050 REM{2 SPACES}------SUB
         CORRECT----
JX 1060 PRINT"{HOME}":KS$=""
FD 1070 PRINT"{19 DOWN}"TAB(23
        )"{RVS}IS THIS ENTRY"
GP 1080 PRINTTAB(23)"CORRECT (
        Y/N)"
MQ 1090 PRINTTAB(29);:INPUTKS$
SJ 1100 REM{4 SPACES}------ SU
        B 19 STRING ------
MX 1110 FR=LEN(BB$):F=19-FR:TR
        $=RIGHT$(ZX$,F)
JQ 1120 BB$=BB$+TR$:RETURN
EG 1130 RETURN
EX 1140 REM{2 SPACES}----SUB S
        KIP-----
JM 1150 IFIK=15ORIK=17THEN PRI
        NT"{DOWN}{UP}"
DJ 1160 RETURN
AH 1170 REM{2 SPACES}---SUB IN
        PUT SKIP---
XM 1180 IFJ=15ORJ>=17THEN PRIN
        T"{DOWN}{UP}"
MM 1190 RETURN
QE 1200 REM{2 SPACES}----SUB B
        LANK SPACE----
BD 1210 FK$=LEFT$(SG$(I,J),1)
HC 1220 IFFK$="←"ORFK$="+"THEN
        SG$(I,J)=ZX$
CQ 1230 RETURN
```

SpeedScript Date And Time Stamper

See instructions in article on page 76 before typing in.

Program 1: *SpeedScript* Date And Time Stamper

```
C8FB:A9 08 AA A0 01 20 BA FF C1
C903:A9 0B A2 4A A0 C9 20 BD 51
C90B:FF A9 00 20 D5 FF 90 01 DB
C913:60 A0 03 B9 6D CA 99 08 CC
C91B:DD 88 10 F7 A2 F6 A0 CA 3E
C923:8E 32 03 8C 33 03 A9 C7 74
C92B:8D B1 09 A2 55 A0 C9 8E 8C
C933:70 14 8C 71 14 A2 F4 A0 62
C93B:C9 8E A2 11 8C A3 11 A9 7B
C943:FF 8D 6C CA 4C 0D 08 53 6E
C94B:50 45 45 44 53 43 52 49 DA
C953:50 54 20 E7 FF 20 54 CA 9A
C95B:A9 37 85 01 20 6D C9 A9 46
C963:08 85 BA 20 B0 CC 20 60 0F
C96B:CA 60 AE 71 CA BD DC CA 3B
C973:A8 B9 7A CA F0 06 20 D2 78
C97B:FF C8 D0 F5 A9 00 AE 72 D7
C983:CA 20 CD BD A9 2C 20 D2 2B
C98B:FF A9 20 20 D2 FF A2 13 7E
C993:A9 00 20 CD BD AE 73 CA 37
C99B:A9 00 20 CD BD A9 20 20 D9
C9A3:D2 FF A2 20 AD 70 CA 48 04
C9AB:29 10 F0 02 A2 31 8A 20 25
C9B3:D2 FF 68 20 EB C9 A9 3A D3
C9BB:20 D2 FF AD 6F CA 48 4A 70
C9C3:4A 4A 4A 20 EB C9 68 20 D1
C9CB:EB C9 A9 20 20 D2 FF A9 F4
C9D3:41 AC 70 CA C0 80 90 02 19
C9DB:A9 50 20 D2 FF A9 4D 20 EA
C9E3:D2 FF A9 0D 20 D2 FF 60 93
C9EB:29 0F 18 69 30 20 D2 FF 19
C9F3:60 A0 03 B9 08 DD 99 6D 34
C9FB:CA 88 10 F7 AD 70 CA 29 86
CA03:80 D0 46 AD 6C CA D0 46 27
CA0B:A9 FF 8D 6C CA AE 71 CA AC
CA13:E0 02 D0 11 A9 1D AC 73 53
CA1B:CA C0 58 F0 0B C0 5C F0 65
CA23:07 C0 60 F0 03 BD E9 CA 35
CA2B:CD 72 CA D0 17 A0 01 8C 74
CA33:72 CA EE 71 CA AD 71 CA 64
CA3B:C9 0D D0 12 8C 71 CA EE E2
CA43:73 CA D0 0A EE 72 CA D0 A7
CA4B:05 A9 00 8D 6C CA 4C 31 FE
CA53:EA A0 05 B9 FA 00 99 74 42
CA5B:CA 88 10 F7 60 A0 05 B9 43
CA63:74 CA 99 FA 00 88 10 F7 03
CA6B:60 00 00 50 00 81 09 1A 68
CA73:56 00 00 00 00 00 00 6A 9E
CA7B:41 4E 55 41 52 59 20 00 3C
CA83:66 45 42 52 55 41 52 59 B8
CA8B:20 00 6D 41 52 43 48 20 43
CA93:00 61 50 52 49 4C 20 00 6C
CA9B:6D 41 59 20 00 6A 55 4E 08
CAA3:45 20 00 6A 55 4C 59 20 39
CAAB:00 61 55 47 55 53 54 20 79
CAB3:00 73 45 50 54 45 4D 42 68
CABB:45 52 20 00 6F 43 54 4F 0D
CAC3:42 45 52 20 00 6E 4F 56 C6
CACB:45 4D 42 45 52 20 00 64 6B
CAD3:45 43 45 4D 42 45 52 20 46
CADB:00 00 00 09 13 1A 21 26 6B
CAE3:2C 32 3A 45 4E 58 00 1F AA
CAEB:1C 1F 1E 1F 1E 1F 1F 1E D6
CAF3:1F 1E 1F A5 BA C9 08 F0 DC
CAFB:08 C9 09 F0 04 4C ED F5 5B
CB03:60 20 ED F5 B0 FA A5 90 3D
CB0B:D0 F6 A2 10 A9 A0 9D 9C C5
CB13:CC CA 10 FA A0 00 A2 00 BF
CB1B:B1 BB C8 C9 2C F0 0C C9 37
CB23:3A F0 F3 9D 9C CC E8 C4 1B
CB2B:B7 90 ED AD 73 CA 38 E9 7C
CB33:55 0A 0A 0A 0A 18 6D 71 D6
CB3B:CA 8D 98 CC AD 72 CA 8D D5
CB43:99 CC AD 70 CA 8D 9A CC 26
CB4B:AD 6F CA 8D 9B CC 20 54 6C
CB53:CA A9 07 85 FF A9 D6 85 CD
CB5B:FB A9 CB 85 FC A9 00 85 41
CB63:FD A9 05 85 FE A5 BA 20 81
CB6B:B1 FF A9 6F 20 93 FF A5 FC
CB73:FD A4 FE 8D D2 CB 8C D3 9E
CB7B:CB A0 00 B9 CF CB 20 A8 53
CB83:FF C8 C0 06 D0 F5 A0 00 65
CB8B:B1 FB 20 A8 FF C8 C0 20 4E
CB93:90 F6 A5 FB 69 1F 85 FB 74
CB9B:A5 FC 69 00 85 FC A5 FD DB
CBA3:69 20 85 FD A5 FE 69 00 84
CBAB:85 FE 20 AE FF C6 FF D0 A0
CBB3:B4 A5 BA 20 B1 FF A9 6F B8
CBBB:20 93 FF A9 55 20 A8 FF 5F
CBC3:A9 43 20 A8 FF 20 AE FF 6D
CBCB:20 60 CA 60 4D 2D 57 00 B8
CBD3:05 20 EA 20 00 C1 78 A9 F6
CBDB:12 A0 01 8D 00 03 8C 01 C3
CBE3:03 20 76 05 A9 03 85 3C C4
CBEB:A2 00 86 4B F0 29 A0 00 C7
CBF3:B1 3B C9 82 D0 19 C8 C8 D9
CBFB:C8 B9 C3 05 C9 2A F0 2E 36
CC03:C9 3F F0 04 D1 3B D0 07 D3
CC0B:C8 C0 13 F0 21 D0 EA E6 B3
CC13:4B A6 4B E0 08 F0 07 BD 43
CC1B:BA 05 85 3B D0 D0 AD 00 DC
CC23:03 F0 07 AC 01 03 A2 00 7F
CC2B:F0 B7 58 4C 45 D9 A0 16 E3
CC33:A2 00 BD C2 05 91 3B C8 AF
CC3B:E8 E0 04 D0 F5 A9 90 85 0C
CC43:00 58 24 00 30 FC 4C 9E 24
CC4B:C1 AC 01 03 84 07 AD 00 DC
CC53:03 85 06 A9 B0 85 00 58 1F
CC5B:24 00 30 FC 78 A5 00 C9 01
CC63:01 D0 24 A9 EE 8D 0C 1C B2
CC6B:A9 06 85 32 A9 00 85 33 BA
CC73:85 30 A9 03 85 31 A9 80 06
CC7B:85 00 58 24 00 30 FC 78 58
CC83:A5 00 C9 01 D0 01 60 18 9C
CC8B:69 18 4C C8 C1 02 22 42 92
CC93:62 82 A2 C2 E2 28 43 29 E6
CC9B:20 31 39 38 36 20 42 4F 42
CCA3:42 20 4B 4F 44 41 44 45 B9
CCAB:4B 00 EA EA EA A9 37 85 E8
CCB3:01 A9 49 8D 22 CF A9 02 DF
CCBB:85 FD A9 0F 8D 1C CF 20 5A
CCC3:E4 CE A9 24 8D 22 CF A9 39
CCCB:06 85 FD A9 00 8D 1C CF 62
CCD3:20 E4 CE A2 01 20 C6 FF D0
CCDB:A9 22 20 AE CE 20 CF FF 58
CCE3:8D 1F CF 20 CF FF 8D 20 C1
CCEB:CF A9 02 8D 1C CF 85 FD 1A
CCF3:20 E4 CE A2 01 20 C6 FF F0
CCFB:A9 8E 20 AE CE A2 45 A0 29
CD03:CF 20 0A CF A2 00 20 CF F1
CD0B:FF 20 D2 FF E8 E0 17 D0 D2
CD13:F5 A2 59 A0 CF 20 0A CF 6A
CD1B:A9 59 20 AE CE A9 00 8D 7B
CD23:1E CF A9 00 8D 1D CF A2 1A
CD2B:00 A9 14 20 D8 CE 20 CF C7
CD33:FF 8D 21 CF 20 B7 FF F0 24
CD3B:49 A9 0D 20 D2 FF A9 00 73
CD43:AE 1E CF 20 CD BD A2 3C A0
CD4B:A0 CF 20 0A CF AE 1F CF 17
CD53:AD 20 CF 20 CD BD A2 2F A3
CD5B:A0 CF 20 0A CF A9 00 85 8A
CD63:FD A9 0F 8D 1C CF 20 E4 68
CD6B:CE A2 01 20 C9 FF A2 84 51
CD73:A0 CF 20 0A CF 20 CC FF 90
```

```
CD7B:A9 01 20 C3 FF A9 36 85 05
CD83:01 60 20 E1 FF F0 D6 AD F8
CD8B:21 CF D0 08 A9 1D 20 AE F6
CD93:CE 4C 8F CE 29 80 D0 04 79
CD9B:A9 2A D0 02 A9 20 20 D2 B1
CDA3:FF AD 21 CF 29 07 0A A8 ED
CDAB:A2 00 B9 25 CF 20 D2 FF C6
CDB3:C8 E8 E0 02 D0 F4 AD 21 01
CDBB:CF 29 40 F0 05 A9 3C 20 08
CDC3:D2 FF 20 CF FF 20 CF FF E9
CDCB:A9 04 20 D8 CE A2 00 20 EF
CDD3:CF FF C9 A0 D0 02 A9 2D A9
CDDB:20 D2 FF E8 E0 10 D0 EF A3
CDE3:A9 03 20 AE CE A9 18 20 71
CDEB:D8 CE 20 CF FF D0 08 A9 A5
CDF3:05 20 AE CE 4C 78 CE 48 07
CDFB:29 0F AA E0 0A B0 05 A9 1A
CE03:20 20 D2 FF 20 A8 CE A9 FD
CE0B:2D 20 D2 FF 20 CF FF AA 8C
CE13:E0 0A B0 05 A9 30 20 D2 2B
CE1B:FF 20 A8 CE A9 2D 20 D2 D7
CE23:FF 68 4A 4A 4A 4A 18 69 DD
CE2B:55 AA 20 A8 CE A9 21 20 2C
CE33:D8 CE 20 CF FF 48 A2 20 78
CE3B:29 10 F0 02 A2 31 8A 20 BE
CE43:D2 FF 68 48 29 0F AA 20 D6
CE4B:A8 CE A9 3A 20 D2 FF 20 36
CE53:CF FF 48 4A 4A 4A 4A AA 41
CE5B:20 A8 CE 68 29 0F AA 20 8E
CE63:A8 CE A2 41 68 29 80 F0 4B
CE6B:02 A2 50 8A 20 D2 FF 20 D1
CE73:CF FF 20 CF FF A9 00 20 C0
CE7B:D8 CE 20 CF FF AA 20 CF F4
CE83:FF 20 CD BD A9 0D 20 D2 53
CE8B:FF EE 1E CF 20 BB CE EE 22
CE93:1D CF AD 1D CF C9 08 D0 C1
CE9B:03 4C 25 CD 20 CF FF 20 AF
CEA3:CF FF 4C 2A CD A9 00 20 8A
CEAB:CD BD 60 85 FD A2 00 20 9E
CEB3:CF FF E8 E4 FD D0 F8 60 2A
CEBB:20 CC FF 20 E4 FF F0 0F B6
CEC3:20 E1 FF D0 05 68 68 4C DD
CECB:60 CD 20 E4 FF F0 F1 A2 A9
CED3:01 20 C6 FF 60 48 38 20 87
CEDB:F0 FF 68 A8 18 20 F0 FF AC
CEE3:60 20 CC FF A9 01 20 C3 A8
CEEB:FF A9 01 A6 BA AC 1C CF 0F
CEF3:20 BA FF A5 FD A2 22 A0 0A
CEFB:CF 20 BD FF 20 C0 FF 90 D5
CF03:05 68 68 4C 78 CD 60 86 53
CF0B:FB 84 FC A0 00 B1 FB F0 23
CF13:07 C8 20 D2 FF 4C 10 CF BA
CF1B:60 00 00 00 00 00 00 24 0F
CF23:30 3A 44 4C 53 51 50 47 7E
CF2B:55 52 52 4C 20 42 4C 4F 0B
CF33:43 4B 53 20 46 52 45 45 FE
CF3B:00 20 46 49 4C 45 53 20 7E
CF43:20 00 0D 12 D3 50 45 45 65
CF4B:44 D3 43 52 49 50 54 20 E3
CF53:C4 CF D3 92 20 00 0D 12 1A
CF5B:42 4C 4B 20 2D 20 46 49 5A
CF63:4C 45 4E 41 4D 45 20 20 38
CF6B:2D 2D 2D 20 20 54 50 20 A7
CF73:2D 20 44 41 54 45 20 2D 73
CF7B:2D 20 54 49 4D 45 20 0D A5
CF83:00 55 49 0D 00 00 00 00 72
```

Program 2: Date And Time Loader

```
CA 10 REM SPEEDSCRIPT DATE/TIM
      E BOOT PROGRAM
XS 20 A$="SPEEDSCRIPT DATE"
JB 30 IF A=0 THEN A=1:PRINT"LO
      ADING..."A$:LOAD A$,8,1
SJ 40 PRINT CHR$(147) SPC(131)
       A$
GC 50 ML=51451:CL=51823:U$=CHR
      $(145)+CHR$(145)
CR 60 PRINT SPC(85)"SET THE DA
      TE (MN/DT/YR)":PRINT
QA 70 INPUT"MONTH{2 SPACES}(1-
      12){5 SPACES}{5 LEFT}";M
      N
JP 80 IF MN<1 OR MN>12 THEN PR
      INT U$:GOTO70
CH 90 INPUT" DATE{2 SPACES}(1-
      31){5 SPACES}{5 LEFT}";D
      T
FQ 100 IF DT<1 OR DT>31 THEN P
      RINT U$:GOTO90
EA 110 INPUT" YEAR (86-99)
      {5 SPACES}{5 LEFT}";YR
FF 120 IF YR<86 OR YR>99 THEN
      {SPACE}PRINT U$:GOTO110
HD 130 PRINT SPC(85)"SET THE T
      IME (HR/MS/AM-PM)":PRIN
      T
BJ 140 INPUT"HOURS{2 SPACES}(1
      -12){5 SPACES}{5 LEFT}"
      ;HR
RG 150 IF HR<1 OR HR>12 THEN P
      RINT U$:GOTO140
CF 160 INPUT" MINS{2 SPACES}(0
      -59){5 SPACES}{5 LEFT}"
      ;MS
FQ 170 IF MS >59 THEN PRINT U$
      :GOTO160
MQ 180 INPUT"AM-PM{3 SPACES}(A
      /P){5 SPACES}{5 LEFT}";
      P$
FM 190 IF P$ <>"A" AND P$<>"P"
      THEN PRINT U$:GOTO180
EB 200 FLAG=128:IF P$="A"AND H
      R<12 THEN FLAG=0
RJ 210 IF P$="P"AND HR=12 THEN
       FLAG=0
KF 220 BY=HR:GOSUB300:HR=BY OR
       FLAG
BF 230 BY=MS:GOSUB300:MS=BY
MR 240 POKE CL,MS:POKE CL+1,HR
      :POKE CL+2,MN
GA 250 POKE CL+3,DT:POKE CL+4,
      YR
GG 260 PRINT:PRINT"PUT SPEEDSC
      RIPT DISK IN DRIVE 0, U
      NIT 8"
MB 270 PRINT" - WHEN READY, PR
      ESS RETURN.":SYS 65487:
      SYS ML
RM 280 POKE 52578,240:POKE 525
      79,20
SJ 290 END
AC 300 X=INT(BY/10):Y=BY-10*X:
      BY=16*X+Y:RETURN
```

SpeedSearch

See instructions in article on page 75 before typing in.

```
0801:36 08 0A 00 85 22 53 45 10
0809:41 52 43 48 20 53 54 52 84
0811:49 4E 47 22 3B 53 53 24 56
0819:3A 8B C3 28 53 53 24 29 7D
0821:B1 32 35 A7 99 22 54 4F 05
0829:4F 20 4C 4F 4E 47 21 22 5B
0831:3A 89 31 30 00 40 08 14 0F
0839:00 9E 32 31 31 34 00 00 A4
0841:00 A0 02 B1 2D 8D 30 0B DF
0849:A9 00 8D 2B 0B 8D 31 0B 8E
0851:20 F9 08 20 49 09 A9 AF 64
0859:A0 0B 20 1E AB A9 02 A2 0D
0861:08 A0 00 20 BA FF A9 02 CA
0869:A2 26 A0 0B 20 BD FF 20 31
0871:C0 FF A2 02 20 C6 FF A0 13
0879:06 20 42 09 20 CF FF C9 77
0881:00 D0 F9 A0 04 20 42 09 3D
0889:A5 90 29 40 D0 39 20 CF 35
0891:FF C9 22 D0 F3 20 09 0B A2
0899:A0 00 20 CF FF C9 22 F0 57
08A1:07 99 9F 0B C8 4C 9B 08 F6
08A9:20 CF FF C9 20 F0 F9 C9 DC
08B1:50 D0 09 20 27 09 20 15 F3
08B9:09 EE 31 0B 20 E1 FF D0 3A
08C1:03 4C 16 0B 4C 7D 08 20 62
08C9:CC FF A9 02 20 C3 FF 20 C5
08D1:F9 08 AD 31 0B F0 14 20 0E
08D9:BC 09 20 15 09 CE 31 0B D0
08E1:20 E1 FF D0 03 4C 16 0B 08
08E9:4C D3 08 AD 2B 0B D0 07 1F
08F1:A9 4B A0 0B 20 1E AB 60 9F
08F9:A5 2D 8D 29 0B A5 2E 8D 45
0901:2A 0B 18 AD 29 0B 69 05 16
0909:8D 29 0B AD 2A 0B 69 00 B8
0911:8D 2A 0B 60 18 AD 29 0B B0
0919:69 11 8D 29 0B AD 2A 0B D6
0921:69 00 8D 2A 0B 60 AD 29 9A
0929:0B 85 FC AD 2A 0B 85 FD 23
0931:A0 00 B9 9F 0B 91 FC C8 26
0939:C0 10 D0 F6 A9 00 91 FC A6
0941:60 20 CF FF 88 D0 FA 60 63
0949:A9 01 A2 08 A0 0F 20 BA 81
0951:FF A9 00 20 BD FF 20 C0 BE
0959:FF A2 01 20 C9 FF A9 49 21
0961:20 D2 FF 20 CC FF A9 01 F4
0969:20 C3 FF 60 A0 00 CC 30 51
0971:0B B0 0D B1 FC D1 FE F0 10
0979:03 A9 FF 60 C8 4C 6F 09 DC
0981:A9 00 60 86 FC 84 FD A0 73
0989:01 CC 30 0B B0 0A B1 FC 14
0991:88 91 FC C8 C8 4C 8A 09 0E
0999:60 8D 28 0B C9 41 90 0A 73
09A1:C9 5B B0 06 38 E9 40 8D 5D
09A9:28 0B 29 3F 0E 28 0B 2C FE
09B1:28 0B 10 02 09 80 70 02 E9
09B9:09 40 60 A9 03 A2 08 A0 5A
09C1:03 20 BA FF A9 10 AE 29 C8
09C9:0B AC 2A 0B 20 BD FF 20 9A
09D1:C0 FF A2 03 20 C6 FF 20 05
09D9:CF FF 8D 2E 0B 20 CF FF E0
09E1:8D 2F 0B 38 A9 00 ED 2E C2
09E9:0B 8D 28 0B A9 25 ED 2F 87
09F1:0B 0D 28 0B D0 08 A9 FF 7C
09F9:8D 2B 0B 4C 02 0A 4C 00 94
0A01:0B A9 74 A0 0B 20 1E AB 5E
0A09:AD 29 0B AC 2A 0B 20 1E 46
0A11:AB A9 AF A0 0B 20 1E AB 26
0A19:A0 00 8C 2C 0B 8C 2D 0B C1
0A21:A5 90 29 40 D0 5D 20 CF 61
0A29:FF 20 9A 09 99 32 0B C8 9D
0A31:CC 30 0B 90 EB A9 32 85 12
0A39:FC A9 0B 85 FD A0 03 B1 1A
0A41:2D 85 FE A0 04 B1 2D 85 FD
0A49:FF 20 6D 09 F0 03 4C 5A 2A
0A51:0A EE 2C 0B D0 03 EE 2D F9
0A59:0B 20 E1 FF D0 03 4C 16 78
0A61:0B A2 32 A0 0B 20 84 09 DE
0A69:A5 90 29 40 D0 15 20 CF 88
0A71:FF 20 9A 09 CE 30 0B AC 6B
0A79:30 0B 99 32 0B EE 30 0B 3E
0A81:4C 36 0A 38 AD 2C 0B E9 2C
0A89:00 8D 28 0B AD 2D 0B E9 D8
0A91:00 0D 28 0B F0 33 38 AD 11
0A99:2C 0B E9 01 8D 28 0B AD A4
0AA1:2D 0B E9 00 0D 28 0B F0 5C
0AA9:2A AC 2C 0B AD 2D 0B 20 8C
0AB1:95 B3 20 DD BD 20 1E AB B5
0AB9:A9 8A A0 0B 20 1E AB A9 84
0AC1:91 A0 0B 20 1E AB 4C E2 45
0AC9:0A A9 86 A0 0B 20 1E AB E8
0AD1:4C DB 0A A9 81 A0 0B 20 A3
0AD9:1E AB A9 8A A0 0B 20 1E 55
0AE1:AB A9 94 A0 0B 20 1E AB 93
0AE9:AD 29 0B AC 2A 0B 20 1E 27
0AF1:AB A9 AF A0 0B 20 1E AB 07
0AF9:A9 AF A0 0B 20 1E AB 20 84
0B01:CC FF A9 03 20 C3 FF 60 53
0B09:A0 00 A9 A0 99 9F 0B C8 D8
0B11:C0 10 90 F8 60 20 CC FF 4A
0B19:A9 02 20 C3 FF A9 03 20 91
0B21:C3 FF 4C 7B E3 24 30 00 6A
0B29:00 00 00 00 00 00 00 00 3F
0B31:00 00 00 00 00 00 00 00 47
0B39:00 00 00 00 00 00 00 00 4F
0B41:00 00 00 00 00 00 00 00 57
0B49:00 00 4E 4F 20 53 50 45 52
0B51:45 44 53 43 52 49 50 54 66
0B59:20 46 49 4C 45 53 20 46 FC
0B61:4F 55 4E 44 20 4F 4E 20 7D
```

```
0B69:54 48 49 53 20 44 49 53 12
0B71:4B 2E 00 53 45 41 52 43 05
0B79:48 49 4E 47 2E 2E 2E 00 CA
0B81:20 4F 4E 45 00 20 4E 4F 06
0B89:00 20 4D 41 54 43 48 00 A5
0B91:45 53 00 20 46 4F 55 4E 89
0B99:44 20 49 4E 20 00 00 00 E8
0BA1:00 00 00 00 00 00 00 00 B7
0BA9:00 00 00 00 00 00 0D 00 D9
```

BEFORE TYPING . . .

Before typing in programs, please refer to "How To Type In COMPUTE!'s GAZETTE Programs," which appears before the Program Listings.

No-SYS Loader

See instructions in article on page 87 before typing in.

```
0801:0B 08 0A 00 9E 32 30 36 2E
0809:31 00 00 00 20 E7 FF A9 FB
0811:00 A2 36 A0 03 20 BD FF AE
0819:A0 00 20 1E 09 A9 08 85 E3
0821:BA A9 C0 85 9D A9 00 85 82
0829:93 85 90 A5 BA A4 B7 D0 79
0831:05 A2 08 4C 37 A4 20 B3 72
0839:F5 A9 60 85 B9 20 D5 F3 01
0841:A5 BA 20 09 ED A5 B9 20 01
0849:C7 ED 20 13 EE 8D 3B 0A 1C
0851:AA A5 90 4A 4A 90 05 A2 18
0859:04 4C 37 A4 A0 63 20 2F B1
0861:F1 20 C1 F5 A0 55 20 3B DF
0869:09 20 13 EE 8D 41 0A 8E 6B
0871:83 0A 8D 84 0A 20 CD BD E9
0879:AD 41 0A C9 09 B0 0B 20 CF
0881:28 F5 A0 33 20 3B 09 4C B6
0889:74 A4 38 A9 85 85 AE E9 28
0891:00 8D 2E 0A A9 0A 85 AF 9B
0899:E9 02 8D 36 0A 20 F0 F4 DB
08A1:A0 12 20 3B 09 20 60 A5 6D
08A9:86 7A 84 7B 20 73 00 B0 63
08B1:0D 20 6B A9 A5 14 8D 83 74
08B9:0A A5 15 8D 84 0A A0 75 B6
08C1:20 1E 09 A9 20 D0 03 B9 29
08C9:36 03 99 11 0A 88 10 F7 84
08D1:A0 64 20 1E 09 38 A5 AE 54
08D9:E9 85 8D 2A 0A A5 AF E9 C4
08E1:0A 8D 32 0A A9 01 85 AC 4A
08E9:A9 0A 85 AD A9 61 85 B9 74
08F1:A4 B7 20 D5 F3 20 8F F6 D9
08F9:A5 BA 20 0C ED A5 B9 20 E9
0901:B9 ED A0 00 A9 01 20 DD EE
0909:ED A9 08 20 DD ED 20 24 8A
0911:F6 A5 90 F0 05 A0 47 20 82
0919:3B 09 4C 74 A4 20 3B 09 01
0921:A0 00 20 CF FF C9 22 F0 E0
0929:F9 C9 0D F0 0A 99 36 03 81
0931:C8 C0 15 90 ED A0 14 84 22
0939:B7 60 B9 47 09 F0 06 20 23
0941:D2 FF C8 D0 F5 60 53 4F 0A
0949:55 52 43 45 20 46 49 4C 50
0951:45 2D 4E 41 4D 45 3A 00 23
0959:0D 0D 53 59 53 2D 41 44 4B
0961:44 52 28 44 45 43 29 20 1D
0969:43 52 3D 53 54 41 52 54 2F
0971:20 4F 46 20 50 47 4D 3A A6
0979:00 0D 46 49 4C 45 20 41 25
0981:44 44 52 20 54 4F 4F 20 B1
0989:4C 4F 57 21 00 0D 53 41 AE
0991:56 45 20 45 52 52 4F 52 45
0999:21 21 00 20 20 20 53 54 03
09A1:41 52 54 20 41 44 44 52 6B
09A9:3A 00 0D 0D 4E 45 57 20 A1
09B1:46 49 4C 45 2D 4E 41 4D 89
09B9:45 3A 00 0D 52 45 4D 41 51
09C1:52 4B 53 3A 00 8D 5C 08 D4
09C9:A0 2D A2 A8 86 0E 84 0F DA
09D1:A0 00 98 91 0E A0 67 A2 C4
09D9:FF 86 14 84 15 A0 68 A2 F6
09E1:00 8E 76 09 8C 77 09 20 6B
09E9:E9 0B A9 01 8D 4F 08 A9 5C
09F1:00 8D 50 08 A9 05 A0 FF 94
09F9:A2 00 20 BA FF A9 00 20 D3
0A01:0B 08 0A 00 9E 32 30 38 34
0A09:38 00 26 08 14 00 8F 20 5E
0A11:20 20 20 20 20 20 20 20 25
0A19:20 20 20 20 20 20 20 20 2D
0A21:20 20 20 20 00 00 00 18 6B
0A29:A9 00 85 FB 69 00 85 25 FD
0A31:A9 00 85 FC 69 00 85 26 17
0A39:18 A9 00 65 FB 85 27 A9 08
0A41:00 65 FC 85 28 A2 FF A0 13
0A49:00 8C 01 08 8C 02 08 F0 8E
0A51:04 B1 25 91 27 C6 25 E4 15
0A59:25 D0 02 C6 26 C6 27 E4 60
0A61:27 D0 02 C6 28 C6 FB E4 23
0A69:FB D0 E6 C6 FC E4 FC D0 3F
0A71:E0 A5 28 C9 A0 B0 0A 85 62
0A79:34 85 38 A5 27 85 33 85 A5
0A81:37 4C 00 80 00 00 00 00 4C
```

SpeedScript 3.2

See instructions in article on page 54 before typing in.

```
0801:0B 08 0A 00 9E 32 30 36 2E
0809:31 00 00 00 20 88 09 A9 90
0811:CB CD 6E 23 8D 6E 23 F0 D7
0819:03 20 37 09 20 C5 09 4C A0
0821:69 0A A5 26 8D 43 08 A5 AE
0829:27 8D 44 08 A5 9E 8D 46 42
0831:08 A5 9F 8D 47 08 A6 B5 D8
0839:F0 20 A9 00 8D 15 20 A0 A0
0841:00 B9 01 26 99 00 26 C8 24
0849:CC 15 20 D0 F4 EE 44 08 0A
0851:EE 47 08 E0 00 F0 07 CA 56
0859:D0 E0 A5 B4 D0 DE 60 A5 72
0861:B5 AA 05 B4 D0 01 60 18 46
0869:8A 65 27 8D 8B 08 A5 26 C3
0871:8D 8A 08 18 8A 65 9F 8D 24
0879:8E 08 A5 9E 8D 8D 08 E8 0D
0881:A4 B4 D0 04 F0 0D A0 FF 68
0889:B9 4F 24 99 50 24 88 C0 4D
0891:FF D0 F5 CE 8B 08 CE 8E 2A
0899:08 CA D0 EA 60 A9 28 85 A8
08A1:C3 85 14 A9 04 85 C4 A9 7B
08A9:D8 85 15 AD 11 20 85 FB 15
08B1:AD 12 20 85 FC A2 01 AD 9B
08B9:14 20 85 0C AD 1D 0D 8D D6
08C1:20 D0 A0 00 AD 2C 0D 91 F3
08C9:14 B1 FB 99 1D 20 C8 29 8D
08D1:7F C9 1F F0 13 C0 28 D0 C3
08D9:EB 88 B1 FB 29 7F C9 20 F2
08E1:F0 05 88 D0 F5 A0 27 C8 13
08E9:84 3B 88 B9 1D 20 91 C3 08
08F1:88 10 F8 A4 3B 18 98 65 84
08F9:FB 85 FB A5 FC 69 00 85 56
0901:FC E0 01 D0 03 8C 10 20 81
0909:C0 28 F0 08 A9 20 91 C3 D8
0911:C8 4C 09 09 18 A5 C3 69 94
0919:28 85 C3 85 14 90 04 E6 43
0921:C4 E6 15 E8 E0 19 F0 03 D0
0929:4C C3 08 A5 FB 8D 1B 20 1A
0931:A5 FC 8D 1C 20 60 AD 08 AE
0939:20 85 FB 8D 11 20 8D 17 50
0941:20 85 39 AD 09 20 85 FC 97
0949:8D 12 20 8D 18 20 85 3A 0A
0951:38 AD 0B 20 ED 09 20 AA CC
0959:A9 20 A0 FF C6 FC 91 FB A5
0961:C8 E6 FC 91 FB C8 D0 FB EA
0969:E6 FC CA D0 F6 91 FB 60 EA
0971:85 3B 84 3C A0 00 B1 3B 0D
0979:F0 06 20 D2 FF C8 D0 F6 72
0981:60 20 E4 FF F0 FB 60 A9 4A
0989:93 20 D2 FF A9 36 85 01 F9
0991:A9 00 8D 14 20 8D 08 20 D2
0999:8D 0A 20 8D 0C 20 8D 0E DB
09A1:20 8D B0 20 8D CF 20 A9 D4
09A9:24 18 69 01 8D 09 20 A9 8B
09B1:CF 8D 0B 20 A9 D0 8D 0D 2B
09B9:20 A9 FF 8D 0F 20 8D AE E1
09C1:20 4C 84 FF 20 E2 0D A9 D7
09C9:80 8D 8A 02 85 9D 20 5D 31
09D1:11 A9 06 8D 18 03 A9 0A 9A
09D9:8D 19 03 AD 08 20 85 39 39
09E1:AD 09 20 85 3A 20 F6 09 B2
09E9:A9 26 A0 1E 20 71 09 EE 18
09F1:13 20 60 EA EA 20 4E 0A CE
09F9:A9 12 A0 1E 20 71 09 A9 DD
0A01:00 8D 13 20 60 48 8A 48 5E
0A09:98 48 A9 7F 8D 0D DD AC B1
0A11:0D DD 10 03 4C 72 FE AD 2D
0A19:71 24 F0 06 A5 02 A0 00 E3
0A21:91 39 A9 02 85 0C 20 CC 0B
0A29:FF 20 4E 0A A9 F7 A0 1F 3D
0A31:20 71 09 20 A7 10 D0 09 FC
0A39:20 45 14 78 A9 7F 4C 66 03
0A41:FE 20 45 14 A2 FA 9A 20 1D
0A49:C5 09 4C 69 0A A2 27 A9 75
0A51:20 9D 00 04 CA 10 FA A9 53
0A59:13 4C D2 FF 48 29 80 4A 96
0A61:85 3B 68 29 3F 05 3B 60 8B
0A69:A0 00 8C 71 24 B1 39 85 56
0A71:02 A0 00 B1 39 49 80 91 4B
0A79:39 AD 71 24 49 01 8D 71 E0
0A81:24 20 9E 08 20 E4 FF D0 69
0A89:0D A5 A2 29 10 F0 F5 A9 4E
0A91:00 85 A2 4C 72 0A AA A0 D1
0A99:00 A5 02 91 39 8C 71 24 73
0AA1:E0 5F D0 0C 20 70 0C A9 5D
0AA9:20 A0 00 91 39 4C 69 0A E6
0AB1:AD 13 20 F0 07 8A 48 20 87
0AB9:F6 09 68 AA 8A C9 0D D0 A9
0AC1:02 A2 5F 8A 29 7F C9 20 0F
0AC9:90 4E E0 A0 D0 02 A2 20 D3
0AD1:8A 48 A0 00 B1 39 C9 1F 76
0AD9:F0 05 AD 14 20 F0 03 20 89
0AE1:38 10 68 20 5D 0A A0 00 79
0AE9:91 39 20 9E 08 38 A5 39 A8
0AF1:ED 17 20 85 3B A5 3A ED F1
0AF9:18 20 05 3B 90 0E A5 39 B7
0B01:69 00 8D 17 20 A5 3A 69 64
0B09:00 8D 18 20 E6 39 D0 02 47
0B11:E6 3A 20 B1 0B 4C 69 0A AE
0B19:8A AE 3B 0B DD 3B 0B F0 1B
0B21:06 CA D0 F8 4C 69 0A CA 7D
0B29:8A 0A AA A9 0A 48 A9 68 24
0B31:48 BD 64 0B 48 BD 63 0B 23
0B39:48 60 27 1D 9D 89 85 02 62
0B41:0C 8A 86 14 94 04 13 09 F5
0B49:93 87 8B 05 88 8C 16 91 01
0B51:11 9F 12 18 1A 10 1C 1E 03
0B59:06 01 0B 08 1F 03 83 0A AA
0B61:8D 07 66 0C 6F 0C 7A 0C 3A
0B69:B0 0C 10 0D 1D 0D 2C 0D 30
0B71:92 0D D9 0E 37 10 0D 0F 53
0B79:50 0F 9D 10 BE 10 E0 10 38
0B81:01 11 A3 11 CA 13 B5 12 02
0B89:19 14 2C 0D 92 0D 61 14 27
0B91:7B 15 21 16 F4 0C B3 16 85
0B99:A8 13 4F 1B F4 0E 31 16 BC
0BA1:E1 0D E8 1B EF 1D F4 0F A7
0BA9:EC 0F 8B 1C 1C 10 C7 1B F8
0BB1:20 0F 0C 38 A5 39 ED 11 9F
0BB9:20 A5 3A ED 12 20 B0 20 02
0BC1:38 AD 11 20 ED 08 20 85 D8
0BC9:3B AD 12 20 ED 09 20 05 06
0BD1:3B F0 0D A5 39 8D 11 20 FF
0BD9:A5 3A 8D 12 20 20 9E 08 EA
0BE1:38 AD 1B 20 E5 39 85 FB FF
0BE9:AD 1C 20 E5 3A 85 FC 05 27
0BF1:FB F0 02 B0 18 18 AD 11 1B
0BF9:20 6D 10 20 8D 11 20 AD 1E
0C01:12 20 69 00 8D 12 20 20 6C
0C09:9E 08 4C E1 0B 60 38 AD 12
0C11:17 20 ED 0A 20 85 3B AD 56
0C19:18 20 ED 0B 20 05 3B 90 CF
0C21:0C AD 0A 20 8D 17 20 AD A4
0C29:0B 20 8D 18 20 38 A5 39 68
0C31:ED 08 20 85 3B A5 3A ED 71
0C39:09 20 05 3B B0 0B AD 08 47
0C41:20 85 39 AD 09 20 85 3A DA
0C49:60 38 A5 39 ED 17 20 85 79
```

```
0C51:3B A5 3A ED 18 20 05 3B 1D
0C59:B0 01 60 AD 17 20 85 39 6E
0C61:AD 18 20 85 3A 60 E6 39 0D
0C69:D0 02 E6 3A 4C B1 0B A5 CF
0C71:39 D0 02 C6 3A C6 39 4C B2
0C79:B1 0B A5 39 85 FB A5 3A 17
0C81:85 FC C6 FC A0 FF B1 FB A8
0C89:C9 20 F0 04 C9 1F D0 03 5C
0C91:88 D0 F3 B1 FB C9 20 F0 F3
0C99:08 C9 1F F0 04 88 D0 F3 F2
0CA1:60 38 98 65 FB 85 39 A5 6F
0CA9:FC 69 00 85 3A 4C B1 0B 64
0CB1:A0 00 B1 39 C9 20 F0 08 9C
0CB9:C9 1F F0 04 C8 D0 F3 60 AE
0CC1:C8 D0 0B E6 3A A5 3A CD EC
0CC9:18 20 90 02 D0 19 B1 39 AF
0CD1:C9 20 F0 EC C9 1F F0 E8 59
0CD9:18 98 65 39 85 39 A5 3A FA
0CE1:69 00 85 3A 4C B1 0B AD EF
0CE9:17 20 85 39 AD 18 20 85 6D
0CF1:3A 4C B1 0B A9 00 8D 11 9A
0CF9:20 AD 18 20 38 E9 04 CD D1
0D01:09 20 B0 03 AD 09 20 8D 4D
0D09:12 20 20 9E 08 4C E8 0C 71
0D11:EE 1D 0D AD 1D 0D 29 0F E4
0D19:8D 1D 0D 60 0C EE 2C 0D 6A
0D21:AD 2C 0D 29 0F 8D 2C 0D 65
0D29:4C 9E 08 0B A5 39 85 FB DB
0D31:A5 3A 85 FC C6 FC A0 FF 98
0D39:B1 FB C9 2E F0 0C C9 21 B3
0D41:F0 08 C9 3F F0 04 C9 1F 4D
0D49:D0 04 88 D0 EB 60 B1 FB 2B
0D51:C9 2E F0 1B C9 21 F0 17 77
0D59:C9 3F F0 13 C9 1F F0 0F 33
0D61:88 D0 EB C6 FC A5 FC CD 24
0D69:08 20 B0 E2 4C 86 0D 84 EE
0D71:3B C6 3B C8 F0 0A B1 FB DD
0D79:C9 20 F0 F7 88 4C A2 0C E4
0D81:A4 3B 4C 4F 0D AD 08 20 8A
0D89:85 39 AD 09 20 85 3A 4C D2
0D91:B1 0B A0 00 B1 39 C9 2E 8F
0D99:F0 1D C9 21 F0 19 C9 3F 7D
0DA1:F0 15 C9 1F F0 11 C8 D0 D2
0DA9:EB E6 3A A5 3A CD 18 20 6E
0DB1:F0 E2 90 E0 4C E8 0C C8 04
0DB9:D0 0E E6 3A A5 3A CD 18 0A
0DC1:20 90 05 F0 03 4C E8 0C E6
0DC9:B1 39 C9 20 F0 E9 C9 2E 37
0DD1:F0 E5 C9 21 F0 E1 C9 3F 0B
0DD9:F0 DD C9 1F F0 D9 4C D9 70
0DE1:0C AD 0C 20 8D 8C 20 AD 7D
0DE9:0D 20 8D 8D 20 20 4E 0A 45
0DF1:A9 3A A0 1E 20 71 09 A9 E7
0DF9:01 8D 13 20 60 38 A5 39 C4
0E01:ED 08 20 85 3B A5 3A ED 45
0E09:09 20 05 3B D0 03 68 68 D1
0E11:60 A5 39 85 26 A5 3A 85 08
0E19:27 60 38 A5 39 85 9E 49 A8
0E21:FF 65 26 8D 90 20 A5 3A BE
0E29:85 9F 49 FF 65 27 8D 91 8D
0E31:20 A5 26 8D 92 20 A5 27 EB
0E39:8D 93 20 A5 9E 8D 94 20 D3
0E41:85 26 A5 9F 8D 95 20 85 E0
0E49:27 38 AD 91 20 6D 8D 20 C7
0E51:CD 0F 20 90 14 20 4E 0A EC
0E59:A9 49 A0 1E 20 71 09 A9 15
0E61:01 8D 13 20 A9 00 85 C6 E4
0E69:60 AD 8C 20 85 9E AD 8D 44
0E71:20 85 9F AD 90 20 85 B4 92
0E79:18 6D 8C 20 8D 8C 20 AD 1D
0E81:91 20 85 B5 6D 8D 20 8D E9
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1C61:3C 90 18 38 A5 3B ED B0 09
1C69:20 85 39 8D AD 20 A5 3C 88
1C71:E9 00 85 3A 8D AE 20 20 7A
1C79:B1 0B 60 20 4E 0A A9 DF 29
1C81:A0 1F 20 71 09 A9 01 8D 6B
1C89:13 20 60 AD 8D 02 C9 05 47
1C91:D0 23 20 4E 0A A9 E9 A0 4F
1C99:1F 20 71 09 20 38 12 8D BB
1CA1:CF 20 F0 0E A0 00 B9 45 86
1CA9:20 99 D0 20 C8 CC 1A 20 42
1CB1:D0 F4 4C F6 09 38 A5 39 36
1CB9:85 9E ED AD 20 85 3B A5 28
1CC1:3A 85 9F ED AE 20 05 3B 86
1CC9:D0 65 A9 FF 8D AE 20 18 78
1CD1:AD B0 20 65 39 85 26 A9 3D
1CD9:00 65 3A 85 27 38 AD 17 97
1CE1:20 E5 9E 85 B4 AD 18 20 7C
1CE9:E5 9F 85 B5 20 23 08 38 DE
1CF1:AD 17 20 ED B0 20 8D 17 E1
1CF9:20 AD 18 20 E9 00 8D 18 35
1D01:20 AD CF 20 F0 29 8D A9 A3
1D09:20 A9 00 8D AA 20 20 4E FA
1D11:10 A0 00 B9 D0 20 20 5D BB
1D19:0A 91 39 C8 CC CF 20 D0 27
1D21:F2 18 A5 39 6D CF 20 85 93
1D29:39 A5 3A 69 00 85 3A 4C 1E
1D31:B1 0B A0 00 CC 15 20 F0 07
1D39:20 B1 FD 30 1D 20 47 16 C0
1D41:20 D0 1D 20 6A 16 AD AC 19
1D49:20 F0 0A A9 08 20 6A 16 57
1D51:A9 5F 20 6A 16 C8 4C 35 84
1D59:1D 60 8C A7 20 29 7F 8D 78
1D61:A8 20 20 47 16 C9 43 D0 9F
1D69:1B 38 AD A3 20 ED 15 20 32
1D71:4A 38 ED 98 20 A8 A9 20 3D
1D79:20 6A 16 88 D0 FA AC A7 1D
1D81:20 4C 56 1D C9 45 D0 11 91
1D89:38 AD 99 20 ED 15 20 38 BC
1D91:ED 98 20 A8 A9 20 4C 79 57
1D99:1D C9 55 D0 0B AD AC 20 15
1DA1:49 01 8D AC 20 4C 56 1D 39
1DA9:C9 23 D0 17 AE 9F 20 AD FE
1DB1:A0 20 A0 37 84 01 20 CD 02
1DB9:BD A0 36 84 01 AC A7 20 34
1DC1:4C 56 1D AE A8 20 BD EE 76
1DC9:20 20 6A 16 4C 56 1D AE 6F
1DD1:AB 20 F0 1A 85 3B 29 7F 94
1DD9:C9 41 90 12 C9 5B B0 0E A7
1DE1:AA A5 3B 29 80 49 80 4A 49
1DE9:4A 85 3B 8A 05 3B 60 20 B0
1DF1:4E 0A 38 AD 0A 20 ED 17 7B
1DF9:20 AA AD 0B 20 ED 18 20 5E
1E01:A0 37 84 01 20 CD BD A0 50
1E09:36 84 01 A9 01 8D 13 20 C0
1E11:60 08 0E 9B 92 D3 50 45 C4
1E19:45 44 D3 43 52 49 50 54 64
1E21:20 33 2E 32 00 20 42 59 81
1E29:20 C3 48 41 52 4C 45 53 25
1E31:20 C2 52 41 4E 4E 4F 4E 25
1E39:00 C2 55 46 46 45 52 20 41
1E41:C3 4C 45 41 52 45 44 00 5F
1E49:C2 55 46 46 45 52 20 C6 E3
1E51:55 4C 4C 00 C4 45 4C 45 ED
1E59:54 45 20 28 D3 2C D7 2C C2
1E61:D0 29 00 3A 20 C1 52 45 E5
1E69:20 59 4F 55 20 53 55 52 96
1E71:45 3F 20 28 D9 2F CE 29 F8
1E79:3A 00 C5 D2 C1 D3 C5 20 C1
1E81:C1 CC CC 20 D4 C5 D8 D4 B1
1E89:00 C5 52 41 53 45 20 28 AD
1E91:D3 2C D7 2C D0 29 3A 20 40
1E99:12 D2 C5 D4 D5 D2 CE 92 C3
1EA1:20 54 4F 20 45 58 49 54 61
1EA9:00 D0 52 45 53 53 20 46 27
1EB1:4F 52 4D 41 54 20 4B 45 E6
1EB9:59 3A 00 D3 41 56 45 3A 96
1EC1:00 D4 41 50 45 20 C5 D2 69
1EC9:D2 CF D2 00 D3 54 4F 50 9C
1ED1:50 45 44 00 D6 45 52 49 C9
1ED9:46 59 20 C5 52 52 4F 52 BC
1EE1:00 CE 4F 20 45 52 52 4F 25
1EE9:52 53 00 93 20 12 D4 92 E2
1EF1:41 50 45 20 4F 52 20 12 A3
1EF9:C4 92 49 53 4B 3F 00 CC BF
1F01:4F 41 44 3A 00 D6 45 52 9B
1F09:49 46 59 3A 00 D0 52 45 79
1F11:53 53 20 12 D2 C5 D4 D5 20
1F19:D2 CE 92 00 C4 49 53 4B 04
1F21:20 43 4F 4D 4D 41 4E 44 4F
1F29:3A 00 24 CE 4F 20 D2 4F E5
1F31:4F 4D 00 CE 4F 20 54 45 40
1F39:58 54 20 49 4E 20 42 55 1E
1F41:46 46 45 52 2E 00 93 D0 6B
1F49:52 49 4E 54 20 54 4F 3A 3D
1F51:20 12 D3 92 43 52 45 45 FA
1F59:4E 2C 12 C4 92 49 53 4B 04
1F61:2C 12 D0 92 52 49 4E 54 26
1F69:45 52 3F 00 C4 45 56 49 F7
1F71:43 45 20 4E 55 4D 42 45 35
1F79:52 3F 00 D3 45 43 4F 4E 12
1F81:44 41 52 59 20 C1 44 44 E6
1F89:52 45 53 53 20 23 3F 00 ED
1F91:D0 52 49 4E 54 20 54 4F F5
1F99:20 46 49 4C 45 4E 41 4D 9A
1FA1:45 3A 00 93 D0 52 49 4E FA
1FA9:54 49 4E 47 2E 2E 2E 0D 36
1FB1:0D 00 C9 4E 53 45 52 54 3D
1FB9:20 4E 45 58 54 20 53 48 DB
1FC1:45 45 54 2C 20 50 52 45 6D
1FC9:53 53 20 12 D2 C5 D4 D5 D8
1FD1:D2 CE 92 00 C8 55 4E 54 0C
1FD9:20 46 4F 52 3A 00 CE 4F 87
1FE1:54 20 C6 4F 55 4E 44 00 8C
1FE9:D2 45 50 4C 41 43 45 20 73
1FF1:57 49 54 48 3A 00 C5 D8 73
1FF9:C9 D4 20 D3 50 45 45 44 F9
2001:D3 43 52 49 50 54 00 00 AE
```

SpeedScript 3.2 File Converter

```
JC 10  PRINT"{CLR}{RVS}{N}
       {2 SPACES}SPEEDSCRIPT FI
       LE CONVERSION PROGRAM
       {3 SPACES}"
BF 20  GOSUB320
SS 30  INPUT"{DOWN}INPUT FILE N
       AME";I$
BB 40  IFI$=""THEN30
DH 50  INPUT"{DOWN}OUTPUT FILE
       {SPACE}NAME";O$
MC 60  PRINT"{DOWN}{RVS}D{OFF}I
       SK, {RVS}S{OFF}CREEN,
       {RVS}P{OFF}RINTER, {RVS}
       O{OFF}THER"
KG 70  GETA$:IFA$=""THEN70
HK 80  DV=-(A$="T")-3*(A$="S")-
       4*(A$="P")-8*(A$="D"):SA
       =7
FS 90  IFDV=0THENINPUT"DEVICE N
       UMBER";DV:INPUT"SECONDAR
       Y ADDRESS";SA
RG 100 PRINT"{2 DOWN}WHICH CON
       VERSION:"
GX 110 PRINT"{DOWN}1) SPEEDSCR
       IPT TO COMMODORE ASCII"
MD 120 PRINT"{DOWN}2) SPEEDSCR
       IPT TO TRUE ASCII"
PQ 130 PRINT"{DOWN}3) COMMODOR
       E ASCII TO SPEEDSCRIPT"
RB 140 GETP$:IFP$<"1"ORP$>"3"T
       HEN140
FP 150 ADR=828+VAL(P$)*3-3
BM 160 OPEN15,8,15,"I0":REM RE
       MOVE ,"I0" IF YOU'VE CH
       ANGED THE DRIVE'S SPEED
SD 170 OPEN1,8,3,I$:INPUT#15,E
       N,EM$:F$=I$:IFEN=0THEN2
       00
EQ 180 PRINT"{DOWN}DISK ERROR
       {SPACE}FOR ";F$:PRINTEM
       $
PG 190 PRINT"{3 DOWN}RUN{3 UP}
       ":CLOSE1:CLOSE2:CLOSE15
       :END
JX 200 IFDV<>8THENOPEN2,DV,SA,
       O$:GOTO290
FR 210 EX$=",S,W":IFP$="3"THEN
       EX$=",P,W"
AB 220 OPEN2,DV,SA,"0:"+O$+EX$
       :INPUT#15,EN,EM$:F$=O$
XM 230 IFEN=0THEN290
FS 240 IFEN<>63THEN180
BM 250 PRINT"{DOWN}";O$;" EXIS
       TS... REPLACE? {RVS}Y
       {OFF}/{RVS}N{OFF}:"
BR 260 GETA$:IFA$<>"Y"ANDA$<>"
       N"THEN260
SC 270 IFA$="N"THEN190
BM 280 PRINT#15,"S0:"+O$:CLOSE
       2:GOTO220
FC 290 SYS(ADR):IF(PEEK(144)AN
       D191)=0THENPRINT"{DOWN}
       DONE.":GOTO190
MK 300 PRINT"I/O ERROR DURING
       {SPACE}CONVERSION.":INP
       UT#15,EN,EM$:IFEN<>0THE
       N180
CJ 310 GOTO190
CF 320 FORI=828TO1001:READA:PO
       KEI,A:CK=CK+A:NEXT:IFCK
       =21584THENRETURN
DA 330 PRINT"{RVS}ERROR IN DAT
       A STATEMENTS.":END
XC 340 DATA 076,069,003,076,12
       2,003
QE 350 DATA 076,174,003,032,22
       5,255
CK 360 DATA 240,018,032,216,00
       3,032
SD 370 DATA 095,003,032,183,25
       5,072
ME 380 DATA 032,224,003,104,04
       1,064
CG 390 DATA 240,233,076,204,25
       5,133
MM 400 DATA 251,041,064,010,00
       5,251
MG 410 DATA 041,191,133,251,04
       1,032
PQ 420 DATA 073,032,010,005,25
       1,201
GE 430 DATA 095,208,002,169,01
       3,133
DD 440 DATA 251,096,032,225,25
       5,240
QP 450 DATA 221,032,216,003,03
       2,095
SM 460 DATA 003,041,127,201,06
       5,144
AB 470 DATA 018,201,091,176,01
       4,170
HM 480 DATA 165,251,041,128,07
       3,128
GR 490 DATA 074,074,133,251,13
       8,005
KK 500 DATA 251,133,251,032,18
       3,255
RH 510 DATA 072,032,224,003,10
       4,041
BF 520 DATA 064,240,207,076,20
       4,255
XP 530 DATA 032,225,255,240,16
       9,032
KE 540 DATA 216,003,201,013,20
       8,002
CF 550 DATA 169,031,072,041,12
       8,074
BK 560 DATA 133,251,104,041,06
       3,005
GE 570 DATA 251,133,251,032,18
       3,255
KC 580 DATA 072,032,224,003,10
       4,041
MC 590 DATA 064,240,217,076,20
       4,255
CP 600 DATA 162,001,032,198,25
       5,076
SX 610 DATA 207,255,162,002,03
       2,201
RC 620 DATA 255,165,251,076,21
       0,255
```

Dazzlers

Article on page 88.

Program 1: Dazzlers—Main Program

```
QP 1 REM DAZZLER MAIN PROGRAM
KR 2 REM
DM 10 FORN=49152TO49176:READK:
      POKEN,K:NEXT
JD 20 DATA 162,0,173,18,208,20
      1,203,208,249
QX 30 DATA 254,0,216,254,0,217
      ,254,0,218
KE 40 DATA 254,0,219,232,208,2
      41,96
GX 50 POKE53280,0:PRINTCHR$(14
      7)
CH 60 FORN=1024TO2023:POKEN,16
      0:NEXT:GOSUB100
FX 70 SYS49152
GF 80 FORN=1TOTD:NEXT:GETA$:IF
      A$=""THEN70
SK 90 POKE 53280,14:PRINT CHR$
      (147):END
```

Program 2: Dazzlers—Subroutine 1

```
KM 98 REM SUBROUTINE 1
RK 99 REM
XS 100 FORR=0TO12:C=R
HC 110 FORL=0TO19:C=(C+1)AND15
AK 120 POKE55296+40*R+L,C:POKE
       55335+40*R-L,C
SR 130 POKE56256-40*R+L,C:POKE
       56295-40*R-L,C:NEXT:NEX
       T
QB 140 TD=50:RETURN
```

Program 3: Dazzlers—Subroutine 2

```
KP 98 REM SUBROUTINE 2
RK 99 REM
XS 100 FORR=0TO12:C=R
HC 110 FORL=0TO19:C=(C+1)AND15
KB 120 POKE55316+40*R+L,C:POKE
       55315+40*R-L,C
JD 130 POKE56276-40*R+L,C:POKE
       56275-40*R-L,C:NEXT:NEX
       T
QB 140 TD=50:RETURN
```

Program 4: Dazzlers—Subroutine 3

```
KJ 98 REM SUBROUTINE 3
RK 99 REM
ME 100 FORR=0TO6:C=R
CE 110 FORL=0TO9:C=(C+1)AND15
ES 120 D=55296+40*R+L:POKED,C:
       POKED+20,C:POKED+480,C:
       POKED+500,C
GJ 130 D=55315+40*R-L:POKED,C:
       POKED+20,C:POKED+480,C:
       POKED+500,C
AC 140 D=55776-40*R+L:POKED,C:
       POKED+20,C:POKED+480,C:
       POKED+500,C
KF 150 D=55795-40*R-L:POKED,C:
       POKED+20,C:POKED+480,C:
       POKED+500,C:NEXT:NEXT
EH 160 TD=50:RETURN
```

Program 5: Dazzlers—Subroutine 4

```
KK 98 REM SUBROUTINE 4
RK 99 REM
PG 100 FORC=0TO11:N=55295+41*C
MG 110 FORK=CTO39-C:N=N+1:POKE
       N,C:NEXT
CA 120 FORK=CTO23-C:N=N+40:POK
       EN,C:NEXT
JP 130 FORK=CTO38-C:N=N-1:POKE
       N,C:NEXT
ER 140 FORK=CTO22-C:N=N-40:POK
       EN,C:NEXT:NEXT
FJ 150 FORN=55788TO55803:POKEN
       ,12:NEXT
CC 160 TD=100:RETURN
```

Program 6: Dazzlers—Subroutine 5

```
KS 98 REM SUBROUTINE 5
RK 99 REM
ME 100 FORC=0TO11:N=55295+41*C
       :B=1
KP 110 FORK=CTO39-C:N=N+1:B=(B
       +1)AND15:POKEN,B:NEXT:B
       =2
SG 120 FORK=CTO23-C:N=N+40:B=(
       B+1)AND15:POKEN,B:NEXT:
       B=1
KG 130 FORK=CTO38-C:N=N-1:B=(B
       +1)AND15:POKEN,B:NEXT:B
       =2
SH 140 FORK=CTO22-C:N=N-40:B=(
       B+1)AND15:POKEN,B:NEXT:
       NEXT:B=17
RP 150 FORN=55788TO55803:B=(B+
       1)AND15:POKEN,B:NEXT
KE 160 TD=80:RETURN
```

Program 7: Dazzlers—ML Source Code

```
;DAZZLER.ASM
;
;THIS ROUTINE INCREMENTS EVERY BYTE
; IN COLOR RAM.
;
*=$C000   ;SYS ADDRESS = 49152
;
     LDX #0       ;INIT. BYTE COUNTER
WAIT LDA $D012    ;GET RASTER LINE
     CMP #203     ;RASTER LINE 203 ?
     BNE WAIT     ;NO, TRY AGAIN
NEXT INC $D800,X ;INC. 1ST PAGE BYTE
     INC $D900,X ;INC. 2ND PAGE BYTE
     INC $DA00,X ;INC. 3RD PAGE BYTE
     INC $DB00,X ;INC. 4TH PAGE BYTE
     INX         ;INC. BYTE COUNTER
     BNE NEXT    ;LOOP UNTIL DONE
     RTS         ;RETURN TO BASIC
.END
```

Gameports

Article on page 90.

Program 1: Gameport Test—64 Version

```
RA 100 PRINT CHR$(147);CHR$(14
       2)
FC 110 PRINT"JOYSTICK/PADDLE T
       EST"
GC 120 PRINT "PRESS <F1> TO ST
       OP"
JR 130 DATA F,R,L,D,U
RH 140 DATA 16,8,4,2,1
BX 150 DIM C(5),B(5)
SG 160 FOR J=1 TO 5:READ C$:C(
       J)=ASC(C$):NEXT J
XA 170 FOR J=1 TO 5:READ B(J):
       NEXT J
DR 180 PRINT CHR$(19):PRINT:PR
       INT
JS 190 G=64
XC 200 FOR P=0 TO 1
DE 210 PRINT
GQ 220 POKE 56333,127
SJ 230 R=PEEK(56321-P)
CJ 240 POKE 56320,G
PJ 250 G=G+G
GB 260 X=PEEK(54297)
HD 270 Y=PEEK(54298)
RF 280 POKE 56333,129
JG 290 FOR B=1 TO 5
QA 300 C=C(B):IF R AND B(B) TH
       EN C=32
GX 310 PRINT CHR$(C);
XG 320 NEXT B
KJ 330 PRINT " PORT:";P+1;"PAD
       DLES:";
MS 340 PRINT RIGHT$("
       {2 SPACES}"+STR$(X),4);
SS 350 PRINT RIGHT$("
       {2 SPACES}"+STR$(Y),4)
JA 360 NEXT P
PX 370 GET X$:IF X$="" GOTO 18
       0
CM 380 IF ASC(X$)<>133 GOTO 18
       0
```

Program 2: Gameport Test—128 Version

```
RA 100 PRINT CHR$(147);CHR$(14
       2)
FC 110 PRINT"JOYSTICK/PADDLE T
       EST"
GC 120 PRINT "PRESS <F1> TO ST
       OP"
JR 130 KEY 1,CHR$(133)
DR 180 PRINT CHR$(19):PRINT:PR
       INT
MF 200 FOR P=1 TO 2
DE 210 PRINT
MQ 220 P1=P*2-1
RC 230 J=JOY(P):Y=32
XR 240 IF J>127 THEN J=J-128:Y
       =70
DA 250 PRINT RIGHT$("
       {2 SPACES}"+STR$(J),3);
       CHR$(Y);
CP 260 PRINT " PORT";P;"PADDLE
       S:";
CQ 270 FOR B=P1 TO P1+1
CR 280 X=POT(B):Y=32
KQ 290 IF X>255 THEN X=X-256:Y
       =66
XS 300 PRINT RIGHT$("
       {2 SPACES}"+STR$(X),4);
       CHR$(Y);
DF 310 NEXT B
CP 320 PRINT
JA 360 NEXT P
AB 370 GET X$:IF ASC(X$)<>133
       {SPACE}GOTO 180
```

Power BASIC: Easy ML Line Drawing—Walking Line Demo

Article on page 83.

```
RQ 10 PRINT:PRINT"READING MACH
      INE CODE...";
AE 20 T=0:FORN=4864TO5311:READ
      K:POKEN,K:T=T+K:NEXT
KF 30 IFT=40668THEN50
PM 40 PRINT:PRINT"***** ERROR
      {SPACE}IN DATA STATEMENT
      S *****":PRINT:END
QR 50 POKE5392,INT(RND(0)*256)
      :POKE5393,INT(RND(0)*256
      )
AH 60 POKE5394,INT(RND(0)*256)
      :POKE5395,INT(RND(0)*256
      )
BM 70 COLOR0,16:COLOR1,3:COLOR
      2,6:COLOR3,7:COLOR4,12:G
      RAPHIC3,1
```

```
DC 80 SYS4864
SX 90 COLOR0,12:COLOR1,14:COLO
      R4,14:GRAPHIC0,1:END
QB 100 DATA 169,0,141,50,17,14
       1,52,17
QC 110 DATA 141,54,17,141,56,1
       7,141,25
JG 120 DATA 21,141,21,21,169,2
       55,141,20
GK 130 DATA 21,160,0,153,192,2
       0,200,192
MB 140 DATA 80,208,248,169,5,1
       41,192,20
XK 150 DATA 141,211,20,169,30,
       141,230,20
PP 160 DATA 169,8,141,249,20,1
       69,2,141
RF 170 DATA 26,21,141,12,21,14
       1,14,21
QE 180 DATA 141,13,21,141,15,2
       1,169,0
PG 190 DATA 133,131,172,21,21,
       200,192,18
JE 200 DATA 208,2,160,0,140,21
       ,21,185
JK 210 DATA 192,20,141,49,17,1
       85,230,20
CD 220 DATA 141,53,17,185,211,
       20,141,51
EK 230 DATA 17,185,249,20,141,
       55,17,32
EH 240 DATA 114,175,173,26,21,
       133,131,174
JD 250 DATA 20,21,232,224,18,2
       08,2,162
KD 260 DATA 0,142,20,21,189,19
       2,20,141
BK 270 DATA 49,17,189,230,20,1
       41,53,17
XK 280 DATA 189,211,20,141,51,
       17,189,249
MG 290 DATA 20,141,55,17,32,11
       4,175,174
QD 300 DATA 20,21,169,160,141,
       27,21,189
SA 310 DATA 192,20,141,22,21,1
       73,12,21
AF 320 DATA 141,24,21,32,75,20
       ,173,24
FD 330 DATA 21,141,12,21,173,2
       2,21,157
MD 340 DATA 193,20,189,230,20,
       141,22,21
HF 350 DATA 173,14,21,141,24,2
       1,32,75
EC 360 DATA 20,173,24,21,141,1
       4,21,173
AR 370 DATA 22,21,157,231,20,1
       69,200,141
KJ 380 DATA 27,21,189,211,20,1
       41,22,21
MA 390 DATA 173,13,21,141,24,2
       1,32,75
DC 400 DATA 20,173,24,21,141,1
       3,21,173
KC 410 DATA 22,21,157,212,20,1
       89,249,20
CF 420 DATA 141,22,21,173,15,2
       1,141,24
SF 430 DATA 21,32,75,20,173,24
       ,21,141
SX 440 DATA 15,21,173,22,21,15
       7,250,20
QS 450 DATA 169,18,141,23,21,2
       06,23,21
QM 460 DATA 236,23,21,208,24,1
       89,193,20
BG 470 DATA 141,192,20,189,231
       ,20,141,230
PQ 480 DATA 20,189,212,20,141,
       211,20,189
GQ 490 DATA 250,20,141,249,20,
       32,159,255
KK 500 DATA 32,228,255,201,0,2
       40,1,96
KB 510 DATA 76,70,19,173,22,21
       ,24,109
EA 520 DATA 24,21,205,27,21,14
       4,56,238
RH 530 DATA 25,21,173,25,21,20
       1,8,208
QX 540 DATA 20,169,1,141,25,21
       ,238,26
FQ 550 DATA 21,173,26,21,201,4
       ,208,5
EQ 560 DATA 169,1,141,26,21,32
       ,154,20
KR 570 DATA 141,23,21,173,24,2
       1,48,9
JF 580 DATA 169,0,56,237,23,21
       ,141,23
FC 590 DATA 21,173,23,21,141,2
       4,21,173
BD 600 DATA 24,21,24,109,22,21
       ,141,22
KJ 610 DATA 21,96,142,23,21,24
       ,162,3
KR 620 DATA 189,16,21,202,125,
       16,21,157
FC 630 DATA 16,21,202,16,247,1
       62,3,254
XP 640 DATA 16,21,208,3,202,16
       ,248,174
JS 650 DATA 23,21,41,3,24,105,
       2,96
```

ScriptRead

Article on page 77.

```
PC 10 PRINTCHR$(147)"LOADING..
      .":PRINT
QE 20 FORJ=49152TO49531:READA:
      POKEJ,A:X=X+A:NEXTJ
GC 30 IFX<>53244THENPRINT"ERRO
      R IN DATA...":END
HM 40 PRINT:PRINT"WHAT WOULD Y
      OU LIKE TO DO? (M=MENU)"
KS 50 POKE198,0
GP 60 GETA$:IFA$="B"THENSYS494
      91:GOTO60
GF 70 IFA$="D"THENN$="$":ML=49
      152:GOTO160
GA 80 IFA$="E"THENPRINT:OPEN15
      ,8,15:SYS49495:GOTO40
FK 90 IFA$="M"THEN210
KA 100 IFA$="R"THEN140
CE 110 IFA$="S"THEN170
HQ 120 IFA$="T"THENSYS49462:GO
       TO60
MR 130 GOTO60
FP 140 GOSUB200:INPUT"READ WHI
       CH FILE";N$:IFN$=""THEN
       40
BR 150 N$=N$+",P,R":ML=49206
KB 160 OPEN1,8,0,N$:SYSML:PRIN
       TCHR$(145):GOTO40
FP 170 GOSUB200:INPUT"SCRATCH
       {SPACE}WHICH FILE";N$:I
       FN$=""THEN40
HQ 180 OPEN15,8,15:PRINT#15,"S
       0:"+N$
BC 190 CLOSE15:GOTO40
KQ 200 N$="":PRINT:PRINT"PRESS
        RETURN ALONE TO CANCEL
       ...":PRINT:RETURN
AH 210 PRINT:PRINT"B=BACKGROUN
       D COLOR"SPC(7)"D=DIRECT
       ORY"
PS 220 PRINT"E=ERROR CHANNEL"S
       PC(10)"R=READ A FILE"
BP 230 PRINT"S=SCRATCH A FILE"
       SPC(9)"T=TEXT COLOR"
XE 240 PRINTTAB(9)"(RUN/STOP W
       ILL EXIT)":GOTO40
JA 250 DATA169,53,32,44,193,32
       ,207,255,32,207,255,32
JG 260 DATA207,255,32,207,255,
       32,207,255,72,32,207,25
       5
AD 270 DATA168,104,170,165,144
       ,240,3,76,153,192,152,3
       2
BJ 280 DATA205,189,169,32,32,2
       10,255,32,209,192,208,2
       48
XF 290 DATA32,204,192,76,11,19
       2,169,0,133,251,133,252
HC 300 DATA133,253,133,254,32,
       44,193,32,209,192,201,3
       1
DK 310 DATA176,9,24,105,64,32,
       237,192,76,149,192,201
GS 320 DATA31,208,33,166,252,2
       08,15,230,252,32,231,19
       2
RP 330 DATA169,110,160,193,32,
       30,171,76,149,192,165,1
       44
CC 340 DATA208,43,32,207,255,2
       01,32,240,245,76,70,192
DB 350 DATA201,32,240,12,201,9
       6,240,8,201,160,240,4
DX 360 DATA201,224,208,6,32,23
       1,192,76,149,192,201,12
       8
KB 370 DATA176,3,32,237,192,16
       5,144,240,170,169,1,32
SE 380 DATA195,255,32,204,255,
       165,2,208,29,165,251,24
       0
EQ 390 DATA3,32,231,192,32,204
       ,192,169,18,32,210,255
SR 400 DATA165,254,166,253,32,
       205,189,169,114,160,193
       ,32
MK 410 DATA30,171,169,0,133,19
       8,133,199,133,212,133,2
       16
GF 420 DATA169,13,76,210,255,1
       65,203,201,3,144,13,201
MJ 430 DATA7,144,246,201,62,20
       8,5,104,104,76,153,192
FP 440 DATA76,207,255,32,249,1
       92,76,6,193,166,251,157
EB 450 DATA121,193,230,251,162
       ,0,134,252,96,169,32,16
       6
DH 460 DATA211,240,249,224,39,
       144,203,76,204,192,165,
       251
SB 470 DATA240,238,24,101,211,
       201,39,144,3,32,204,192
CF 480 DATA162,0,230,253,208,2
       ,230,254,189,121,193,32
QP 490 DATA210,255,232,228,251
       ,144,245,169,0,133,251,
       96
JE 500 DATA133,2,32,68,229,162
       ,1,76,198,255,173,134
SE 510 DATA2,24,105,1,41,15,14
       1,134,2,162,0,157
MA 520 DATA0,216,157,0,217,157
       ,0,218,157,0,219,232
KQ 530 DATA208,241,96,238,33,2
       08,96,162,15,32,198,255
XA 540 DATA32,207,255,32,210,2
       55,201,13,208,246,169,1
       5
HQ 550 DATA32,195,255,76,204,2
       55,13,13,32,0,32,87
KH 560 DATA79,82,68,83,0,66,67
       ,0
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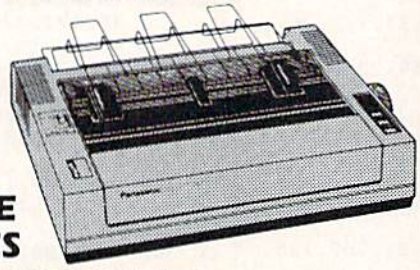

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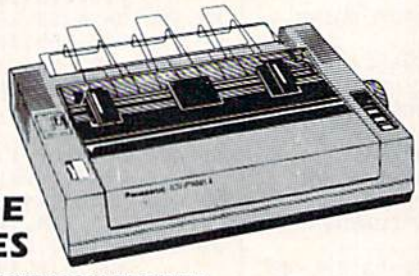

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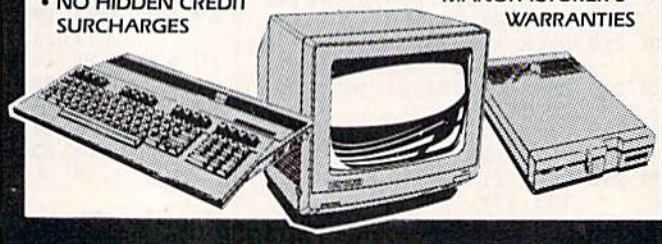

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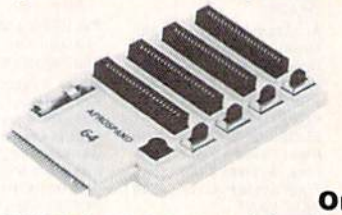

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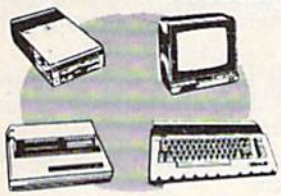

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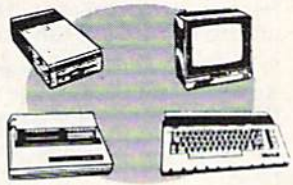

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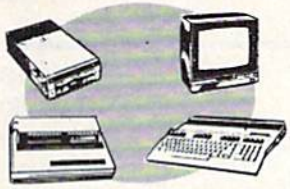

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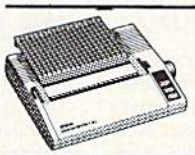

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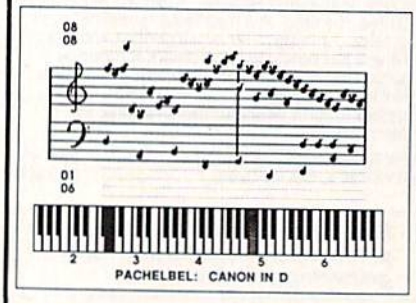

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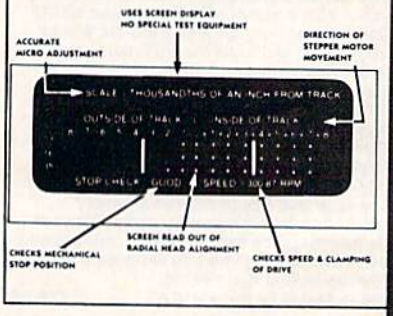

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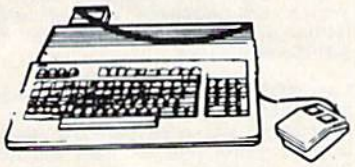

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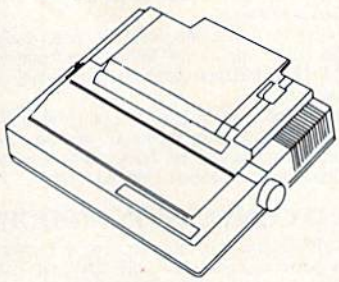

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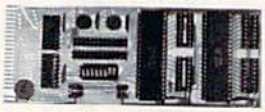

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COMPUTE!'s GAZETTE Author's Guide

Here are some suggestions which serve to improve the speed and accuracy of publication for prospective authors. COMPUTE!'s GAZETTE is primarily interested in new and timely articles on the Commodore 128, 64, Plus/4, and 16. We are much more concerned with the content of an article than with its style, but articles should as be clear and well-explained as possible.

The guidelines below will permit your good ideas and programs to be more easily edited and published:

1. The upper left corner of the first page should contain your name, address, telephone number, and the date of submission.

2. The following information should appear in the upper right corner of the first page. If your article is specifically directed to one model of computer, please state the model name. In addition, *please indicate the memory requirements of programs.*

3. The underlined title of the article should start about 2/3 of the way down the first page.

4. Following pages should be typed normally, except that in the upper right corner there should be an abbreviation of the title, your last name, and the page number. For example: Memory Map/Smith/2.

5. All lines within the text of the article must be double- or triple-spaced. A one-inch margin should be left at the right, left, top, and bottom of each page. No words should be divided at the ends of lines. And please do not justify. Leave the lines ragged.

6. Standard typing or computer paper should be used (no erasable, onionskin, or other thin paper) and typing should be on one side of the paper only (upper- and lowercase).

7. Sheets should be attached together with a paper clip. Staples should not be used.

8. If you are submitting more than one article, send each one in a separate mailer with its own tape or disk.

9. Short programs (under 20 lines) can easily be included within the text. Longer programs should be separate listings. *It is essential that we have a copy of the program, recorded twice, on a tape or disk.* If your article was written with a word processor, we also appreciate a copy of the text file on the tape or disk. Please use high-quality 10 or 30 minute tapes with the program recorded on both sides. The tape or disk should be labeled with the author's name and the title of the article. Tapes are fairly sturdy, but disks need to be enclosed within plastic or cardboard mailers (available at photography, stationery, or computer supply stores).

10. A good general rule is to spell out the numbers zero through ten in your article and write higher numbers as numerals (1024). The exceptions to this are: Figure 5, Table 3, TAB(4), etc. Within ordinary text, however, the zero through ten should appear as words, not numbers. Also, symbols and abbreviations should not be used within text: use "and" (not &), "reference" (not ref.), "through" (not thru).

11. For greater clarity, use all capitals when referring to keys (RETURN, CTRL, SHIFT), BASIC words (LIST, RND, GOTO), and the language BASIC. Headlines and subheads should, however, be initial caps only, and emphasized words are not capitalized. If you wish to emphasize, underline the word and it will be italicized during typesetting.

12. Articles can be of any length—from a single-line routine to a multi-issue series. The average article is about four to eight double-spaced, typed pages.

13. If you want to include photographs, they should be either 5×7 black and white glossies or color slides.

14. We do not consider articles which are submitted simultaneously to other publishers. If you wish to send an article to another magazine for consideration, please do not submit it to us.

15. COMPUTE!'s GAZETTE pays between $70 and $800 for published articles. In general, the rate reflects the length and quality of the article. Payment is made upon acceptance. Following submission (Editorial Department, COMPUTE!'s GAZETTE, P.O. Box 5406, Greensboro, NC 27403) it will take from two to four weeks for us to reply. If your work is accepted, you will be notified by a letter which will include a contract for you to sign and return. *Rejected manuscripts are returned to authors who enclose a self-addressed, stamped envelope.*

16. If your article is accepted and you have since made improvements to the program, please submit an entirely new tape or disk and a new copy of the article reflecting the update. We cannot easily make revisions to programs and articles. It is necessary that you send the revised version as if it were a new submission entirely, but be sure to indicate that your submission is a revised version by writing, "Revision" on the envelope and the article.

17. COMPUTE!'s GAZETTE does not accept unsolicited product reviews. If you are interested in serving on our panel of reviewers, contact our Features Editor for details.

How To Type In *COMPUTE!'s GAZETTE* Programs

Each month, COMPUTE!'s GAZETTE publishes programs for the Commodore 128, 64, Plus/4, 16, and VIC-20. Each program is clearly marked by title and version. Be sure to type in the correct version for your machine. All 64 programs run on the 128 in 64 mode. Be sure to read the instructions in the corresponding article. This can save time and eliminate any questions which might arise after you begin typing.

We frequently publish two programs designed to make typing easier: The Automatic Proofreader, and MLX, designed for entering machine language programs.

When entering a BASIC program, be especially careful with DATA statements as they are extremely sensitive to errors. A mistyped number in a DATA statement can cause your machine to "lock up" (you'll have no control over the computer). If this happens, the only recourse is to turn your computer off then back on, erasing whatever was in memory. So be sure to *save a copy of your program before you run it.* If your computer crashes, you can always reload the program and look for the error.

Special Characters

Most of the programs listed in each issue contain special control characters. To facilitate typing in any programs from the GAZETTE, use the following listing conventions.

The most common type of control characters in our listings appear as words within braces: {DOWN} means to press the cursor down key; {5 SPACES} means to press the space bar five times.

To indicate that a key should be *shifted* (hold down the SHIFT key while pressing another key), the character is underlined. For example, {A} means hold down the SHIFT key and press A. You may see strange characters on your screen, but that's to be expected. If you find a number followed by an underlined key enclosed in braces (for example, {8 A}), type the key as many times as indicated (in our example, enter eight SHIFTed A's).

If a key is enclosed in special brackets, [ ], hold down the Commodore key (at the lower left corner of the keyboard) and press the indicated character.

Rarely, you'll see a single letter of the alphabet enclosed in braces. This can be entered on the Commodore 64 by pressing the CTRL key while typing the letter in braces. For example, {A} means to press CTRL-A.

The Quote Mode

Although you can move the cursor around the screen with the CRSR keys, often a programmer will want to move the cursor under program control. This is seen in examples such as {LEFT} and {HOME} in the program listings. The only way the computer can tell the difference between direct and programmed cursor control is *the quote mode.*

Once you press the quote key, you're in quote mode. This mode can be confusing if you mistype a character and cursor left to change it. You'll see a reverse video character (a graphics symbol for cursor left). In this case, you can use the DELete key to back up and edit the line. Type another quote and you're out of quote mode. If things really get confusing, you can exit quote mode simply by pressing RETURN. Then just cursor up to the mistyped line and fix it.

When You Read:	Press:	See:
{CLR}	SHIFT + CLR/HOME	
{HOME}	CLR/HOME	
{UP}	SHIFT + ↑ CRSR ↓	
{DOWN}	↑ CRSR ↓	
{LEFT}	SHIFT + ← CRSR →	
{RIGHT}	← CRSR →	
{RVS}	CTRL + 9	
{OFF}	CTRL + 0	
{BLK}	CTRL + 1	
{WHT}	CTRL + 2	
{RED}	CTRL + 3	
{CYN}	CTRL + 4	

When You Read:	Press:	See:
{PUR}	CTRL + 5	
{GRN}	CTRL + 6	
{BLU}	CTRL + 7	
{YEL}	CTRL + 8	
{ F1 }	f1	
{ F2 }	SHIFT + f1	
{ F3 }	f3	
{ F4 }	SHIFT + f3	
{ F5 }	f5	
{ F6 }	SHIFT + f5	
{ F7 }	f7	
{ F8 }	SHIFT + f7	

When You Read:	Press:	See:
←	←	
↑	SHIFT + ↑	

For Commodore 64 Only

When You Read:	See:
[1]	COMMODORE + 1
[2]	COMMODORE + 2
[3]	COMMODORE + 3
[4]	COMMODORE + 4
[5]	COMMODORE + 5
[6]	COMMODORE + 6
[7]	COMMODORE + 7
[8]	COMMODORE + 8

The Automatic Proofreader

Philip I. Nelson, Assistant Editor

"The Automatic Proofreader" helps you type in program listings for the 128, 64, Plus/4, 16, and VIC-20 and prevents nearly every kind of typing mistake.

Type in the Proofreader *exactly* as listed. Since the program can't check itself, type carefully to avoid mistakes. Don't omit any lines, even if they contain unfamiliar commands. After finishing, save a copy or two on disk or tape before running it. This is important because the Proofreader erases the BASIC portion of itself when you run it, leaving only the machine language portion in memory.

Next, type RUN and press RETURN. After announcing which computer it's running on, the Proofreader displays the message "Proofreader Active". Now you're ready to type in a BASIC program.

Every time you finish typing a line and press RETURN, the Proofreader displays a two-letter checksum in the upper-left corner of the screen. Compare this result with the two-letter checksum printed to the left of the line in the program listing. If the letters match, it's almost certain the line was typed correctly. If the letters don't match, check for your mistake and correct the line.

The Proofreader ignores spaces not enclosed in quotes, so you can omit or add spaces between keywords and still see a matching checksum. However, since spaces inside quotes are almost always significant, the Proofreader pays attention to them. For example, **10 PRINT"THIS IS BASIC"** will generate a different checksum than **10 PRINT"THIS ISBA SIC"**.

A common typing error is transposition—typing two successive characters in the wrong order, like PIRNT instead of PRINT or 64378 instead of 64738. The Proofreader is sensitive to the *position* of each character within the line and thus catches transposition errors.

The Proofreader does *not* accept keyword abbreviations (for example, ? instead of PRINT). If you prefer to use abbreviations, you can still check the line by LISTing it after typing it in, moving the cursor back to the line, and pressing RETURN. LISTing the line substitutes the full keyword for the abbreviation and allows the Proofreader to work properly. The same technique works for rechecking programs you've already typed in.

If you're using the Proofreader on the Commodore 128, Plus/4, or 16, *do not perform any GRAPHIC commands while the Proofreader is active.* When you perform a command like GRAPHIC 1, the computer moves everything at the start of BASIC program space—including the Proofreader—to another memory area, causing the Proofreader to crash. The same thing happens if you *run* any program with a GRAPHIC command while the Proofreader is in memory.

Though the Proofreader doesn't interfere with other BASIC operations, it's a good idea to disable it before running another program. However, the Proofreader is purposely difficult to dislodge: It's not affected by tape or disk operations, or by pressing RUN/STOP– RESTORE. The simplest way to disable it is to turn the computer off then on. A gentler method is to SYS to the computer's built-in reset routine (SYS 65341 for the 128, 64738 for the 64, 65526 for the Plus/4 and 16, and 64802 for the VIC). These reset routines erase any program in memory, so be sure to save the program you're typing in before entering the SYS command.

If you own a Commodore 64, you may already have wondered whether the Proofreader works with other programming utilities like "MetaBASIC." The answer is generally yes, *if you're using a 64 and activate the Proofreader after installing the other utility.* For example, first load and activate MetaBASIC, then load and run the Proofreader.

When using the Proofreader with another utility, you should disable *both* programs before running a BASIC program. While the Proofreader seems unaffected by most utilities, there's no way to promise that it will work with any and every combination of utilities you might want to use. The more utilities activated, the more fragile the system becomes.

The New Automatic Proofreader

```
10 VEC=PEEK(772)+256*PEEK(773)
   :LO=43:HI=44
20 PRINT "AUTOMATIC PROOFREADE
   R FOR ";:IF VEC=42364 THEN
   {SPACE}PRINT "C-64"
30 IF VEC=50556 THEN PRINT "VI
   C-20"
40 IF VEC=35158 THEN GRAPHIC C
   LR:PRINT "PLUS/4 & 16"
50 IF VEC=17165 THEN LO=45:HI=
   46:GRAPHIC CLR:PRINT"128"
60 SA=(PEEK(LO)+256*PEEK(HI))+
   6:ADR=SA
70 FOR J=0 TO 166:READ BYT:POK
   E ADR,BYT:ADR=ADR+1:CHK=CHK
   +BYT:NEXT
80 IF CHK<>20570 THEN PRINT "*
   ERROR* CHECK TYPING IN DATA
    STATEMENTS":END
90 FOR J=1 TO 5:READ RF,LF,HF:
   RS=SA+RF:HB=INT(RS/256):LB=
   RS-(256*HB)
100 CHK=CHK+RF+LF+HF:POKE SA+L
   F,LB:POKE SA+HF,HB:NEXT
110 IF CHK<>22054 THEN PRINT "
   *ERROR* RELOAD PROGRAM AND
   {SPACE}CHECK FINAL LINE":EN
   D
120 POKE SA+149,PEEK(772):POKE
    SA+150,PEEK(773)
130 IF VEC=17165 THEN POKE SA+
    14,22:POKE SA+18,23:POKESA+
    29,224:POKESA+139,224
140 PRINT CHR$(147);CHR$(17);"
    PROOFREADER ACTIVE":SYS SA
150 POKE HI,PEEK(HI)+1:POKE (P
    EEK(LO)+256*PEEK(HI))-1,0:N
    EW
160 DATA 120,169,73,141,4,3,16
    9,3,141,5,3
170 DATA 88,96,165,20,133,167,
    165,21,133,168,169
180 DATA 0,141,0,255,162,31,18
    1,199,157,227,3
190 DATA 202,16,248,169,19,32,
    210,255,169,18,32
200 DATA 210,255,160,0,132,180
    ,132,176,136,230,180
210 DATA 200,185,0,2,240,46,20
    1,34,208,8,72
220 DATA 165,176,73,255,133,17
    6,104,72,201,32,208
230 DATA 7,165,176,208,3,104,2
    08,226,104,166,180
240 DATA 24,165,167,121,0,2,13
    3,167,165,168,105
250 DATA 0,133,168,202,208,239
    ,240,202,165,167,69
260 DATA 168,72,41,15,168,185,
    211,3,32,210,255
270 DATA 104,74,74,74,74,168,1
    85,211,3,32,210
280 DATA 255,162,31,189,227,3,
    149,199,202,16,248
290 DATA 169,146,32,210,255,76
    ,86,137,65,66,67
300 DATA 68,69,70,71,72,74,75,
    77,80,81,82,83,88
310 DATA 13,2,7,167,31,32,151,
    116,117,151,128,129,167,136
    ,137
```

MLX Machine Language Entry Program For Commodore 64

Ottis Cowper, Technical Editor

"MLX" is a labor-saving utility that allows almost fail-safe entry of Commodore 64 machine language programs.

Type in and save some copies of MLX—you'll want to use it to enter future ML programs from COMPUTE!'s GAZETTE. When you're ready to enter an ML program, load and run MLX. It asks you for a starting address and an ending address. These addresses appear in the article accompanying the MLX-format program listing you're typing.

If you're unfamiliar with machine language, the addresses (and all other values you enter in MLX) may appear strange. Instead of the usual decimal numbers you're accustomed to, these numbers are in *hexadecimal*—a base 16 numbering system commonly used by ML programmers. Hexadecimal—hex for short—includes the numerals 0–9 and the letters A–F. But don't worry—even if you know nothing about ML or hex, you should have no trouble using MLX.

After you enter the starting and ending addresses, you'll be offered the option of clearing the workspace. Choose this option if you're starting to enter a new listing. If you're continuing a listing that's partially typed from a previous session, don't choose this option.

A functions menu will appear. The first option in the menu is ENTER DATA. If you're just starting to type in a program, pick this. Press the E key, and type the first number in the first line of the program listing. If you've already typed in part of a program, type the line number where you left off typing at the end of the previous session (be sure to load the partially completed program before you resume entry). In any case, make sure the address you enter corresponds to the address of a line in the listing you are entering. Otherwise, you'll be unable to enter the data correctly. If you pressed E by mistake, you can return to the command menu by pressing RETURN alone when asked for the address. (You can get back to the menu from most options by pressing RETURN with no other input.)

Entering A Listing

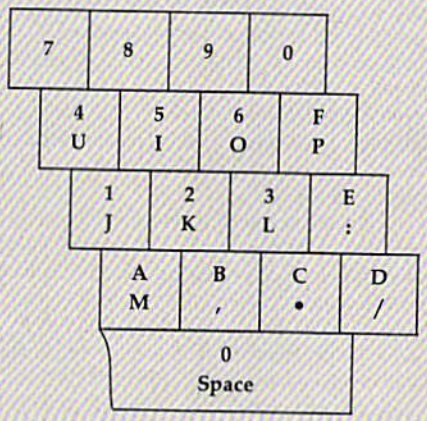
Once you're in Enter mode, MLX prints the address for each program line for you. You then type in all nine numbers on that line, beginning with the first two-digit number after the colon (:). Each line represents eight data bytes and a checksum. Although an MLX-format listing appears similar to the "hex dump" listings from a machine language monitor program, the extra checksum number on the end allows MLX to check your typing.

When you enter a line, MLX recalculates the checksum from the eight bytes and the address and compares this value to the number from the ninth column. If the values match, you'll hear a bell tone, the data will be added to the workspace area, and the prompt for the next line of data will appear. But if MLX detects a typing error, you'll hear a low buzz and see an error message. The line will then be redisplayed for editing.

Invalid Characters Banned

Only a few keys are active while you're entering data, so you may have to unlearn some habits. You *do not* type spaces between the columns; MLX automatically inserts these for you. You *do not* press RETURN after typing the last number in a line; MLX automatically enters and checks the line after you type the last digit.

Only the numerals 0–9 and the letters A–F can be typed in. If you press any other key (with some exceptions noted below), you'll hear a warning buzz. To simplify typing, the numeric keypad modification from the March 1986 "Bug-Swatter" column is now incorporated in the listing. The keypad is active only while entering data. Addresses must be entered with the normal letter and number keys. The figure below shows the keypad configuration:



MLX checks for transposed characters. If you're supposed to type in A0 and instead enter 0A, MLX will catch your mistake. There is one error that can slip past MLX: Because of the checksum formula used, MLX won't notice if you accidentally type FF in place of 00, and vice versa. And there's a very slim chance that you could garble a line and still end up with a combination of characters that adds up to the proper checksum. However, these mistakes should not occur if you take reasonable care while entering data.

Editing Features

To correct typing mistakes before finishing a line, use the INST/DEL key to delete the character to the left of the cursor. (The cursor-left key also deletes.) If you mess up a line really badly, press CLR/HOME to start the line over. The RETURN key is also active, but only before any data is typed on a line. Pressing RETURN at this point returns you to the command menu. After you type a character of data, MLX disables RETURN until the cursor returns to the start of a line. Remember, you can press CLR/HOME to quickly get to a line number prompt.

More editing features are available when correcting lines in which MLX has detected an error. To make corrections in a line that MLX has redisplayed for editing, compare the line on the screen with the one printed in the listing, then move the cursor to the mistake and type the correct key. The cursor left and right keys provide the normal cursor controls. (The INST/DEL key now works as an alternative cursor-left key.) You cannot move left beyond the first character in the line. If you try to move beyond the rightmost character, you'll reenter the line. During editing, RETURN is active; pressing it tells MLX to recheck the line. You can press the CLR/HOME key to clear the entire line if you want to start from scratch, or if you want to get to a line number prompt to use RETURN to get back to the menu.

Display Data

The second menu choice, DISPLAY DATA, examines memory and shows the contents in the same format as the program listing (including the checksum). When you press D, MLX asks you for a starting address. Be sure that the starting address you give corresponds to a line number in the listing. Otherwise, the checksum display will be meaningless. MLX displays program lines until it reaches the end of the program, at which point the menu is redis-

played. You can pause the display by pressing the space bar. (MLX finishes printing the current line before halting.) Press space again to restart the display. To break out of the display and get back to the menu before the ending address is reached, press RETURN.

Other Menu Options

Two more menu selections let you save programs and load them back into the computer. These are SAVE FILE and LOAD FILE; their operation is quite straightforward. When you press S or L, MLX asks you for the filename. You'll then be asked to press either D or T to select disk or tape.

You'll notice the disk drive starting and stopping several times during a load or save. Don't panic; this is normal behavior. MLX opens and reads from or writes to the file instead of using the usual LOAD and SAVE commands. Disk users should also note that the drive prefix 0: is automatically added to the filename (line 750), so this should *not* be included when entering the name. This also precludes the use of @ for Save-with-Replace, so remember to give each version you save a different name.

Remember that MLX saves the entire workspace area from the starting address to the ending address, so the save or load may take longer than you might expect if you've entered only a small amount of data from a long listing. When saving a partially completed listing, make sure to note the address where you stopped typing so you'll know where to resume entry when you reload.

MLX reports the standard disk or tape error messages if any problems are detected during the save or load. (Tape users should bear in mind that Commodore computers are never able to detect errors during a save to tape.) MLX also has three special load error messages: INCORRECT STARTING ADDRESS, which means the file you're trying to load does not have the starting address you specified when you ran MLX; LOAD ENDED AT *address*, which means the file you're trying to load ends before the ending address you specified when you started MLX; and TRUNCATED AT ENDING ADDRESS, which means the file you're trying to load extends beyond the ending address you specified when you started MLX. If you see one of these messages and feel certain that you've loaded the right file, exit and rerun MLX, being careful to enter the correct starting and ending addresses.

The QUIT menu option has the obvious effect—it stops MLX and enters BASIC. The RUN/STOP key is disabled, so the Q option lets you exit the program without turning off the computer. (Of course, RUN/STOP-RESTORE also gets you out.) You'll be asked for verification; press Y to exit to BASIC, or any other key to return to the menu. After quitting, you can type RUN again and reenter MLX without losing your data, as long as you don't use the clear workspace option.

The Finished Product

When you've finished typing all the data for an ML program and saved your work, you're ready to see the results. The instructions for loading and using the finished product vary from program to program. Some ML programs are designed to be loaded and run like BASIC programs, so all you need to type is LOAD *"filename"*,8 for disk or LOAD *"filename"* for tape, and then RUN. Such programs will usually have a starting address of 0801 for the 64. Other programs must be reloaded to specific addresses with a command such as LOAD *"filename"*,8,1 for disk or LOAD *"filename"*,1,1 for tape, then started with a SYS to a particular memory address. On the Commodore 64, the most common starting address for such programs is 49152, which corresponds to MLX address C000. In either case, you should always refer to the article which accompanies the ML listing for information on loading and running the program.

An Ounce Of Prevention

By the time you finish typing in the data for a long ML program, you may have several hours invested in the project. Don't take chances—use our "Automatic Proofreader" to type the new MLX, and then test your copy *thoroughly* before first using it to enter any significant amount of data. Make sure all the menu options work as they should. Enter fragments of the program starting at several different addresses, then use the Display option to verify that the data has been entered correctly. And be sure to test the Save and Load options several times to insure that you can recall your work from disk or tape. Don't let a simple typing error in the new MLX cost you several nights of hard work.

MLX For Commodore 64

```
SS 10 REM VERSION 1.1: LINES 8
      30,950 MODIFIED, LINES 4
      85-487 ADDED
EK 100 POKE 56,50:CLR:DIM IN$,
      I,J,A,B,A$,B$,A(7),N$
DM 110 C4=48:C6=16:C7=7:Z2=2:Z
      4=254:Z5=255:Z6=256:Z7=
      127
CJ 120 FA=PEEK(45)+Z6*PEEK(46)
      :BS=PEEK(55)+Z6*PEEK(56
      ):H$="0123456789ABCDEF"
SB 130 R$=CHR$(13):L$="{LEFT}"
      :S$=" ":D$=CHR$(20):Z$=
      CHR$(0):T$="{13 RIGHT}"
CQ 140 SD=54272:FOR I=SD TO SD
      +23:POKE I,0:NEXT:POKE
      {SPACE}SD+24,15:POKE 78
      8,52
FC 150 PRINT"{CLR}"CHR$(142)CH
      R$(8):POKE 53280,15:POK
      E 53281,15
EJ 160 PRINT T$" {RED}{RVS}
      {2 SPACES}[8 @3
      {2 SPACES}"SPC(28)"
      {2 SPACES}{OFF}{BLU} ML
      X II {RED}{RVS}
      {2 SPACES}"SPC(28)"
      {12 SPACES}{BLU}"
FR 170 PRINT"{3 DOWN}
      {3 SPACES}COMPUTE!'S MA
      CHINE LANGUAGE EDITOR
      {3 DOWN}"
JB 180 PRINT"{BLK}STARTING ADD
      RESS[43";:GOSUB300:SA=A
      D:GOSUB1040:IF F THEN18
      0
GF 190 PRINT"{BLK}{2 SPACES}EN
      DING ADDRESS[43";:GOSUB
      300:EA=AD:GOSUB1030:IF
      {SPACE}F THEN190
KR 200 INPUT"{3 DOWN}{BLK}CLEA
      R WORKSPACE [Y/N][43";A
      $:IF LEFT$(A$,1)<>"Y"TH
      EN220
PG 210 PRINT"{2 DOWN}{BLU}WORK
      ING...";:FORI=BS TO BS+
      EA-SA+7:POKE I,0:NEXT:P
      RINT"DONE"
DR 220 PRINTTAB(10)"{2 DOWN}
      {BLK}{RVS} MLX COMMAND
      {SPACE}MENU {DOWN}[43":
      PRINT T$"{RVS}E{OFF}NTE
      R DATA"
BD 230 PRINT T$"{RVS}D{OFF}ISP
      LAY DATA":PRINT T$"
      {RVS}L{OFF}OAD FILE"
JS 240 PRINT T$"{RVS}S{OFF}AVE
       FILE":PRINT T$"{RVS}Q
      {OFF}UIT{2 DOWN}{BLK}"
JH 250 GET A$:IF A$=N$ THEN250
HK 260 A=0:FOR I=1 TO 5:IF A$=
      MID$("EDLSQ",I,1)THEN A
      =I:I=5
FD 270 NEXT:ON A GOTO420,610,6
      90,700,280:GOSUB1060:GO
      TO250
EJ 280 PRINT"{RVS} QUIT ":INPU
      T"{DOWN}[43ARE YOU SURE
       [Y/N]";A$:IF LEFT$(A$,
      1)<>"Y"THEN220
EM 290 POKE SD+24,0:END
JX 300 IN$=N$:AD=0:INPUTIN$:IF
      LEN(IN$)<>4THENRETURN
KF 310 B$=IN$:GOSUB320:AD=A:B$
      =MID$(IN$,3):GOSUB320:A
      D=AD*256+A:RETURN
PP 320 A=0:FOR J=1 TO 2:A$=MID
      $(B$,J,1):B=ASC(A$)-C4+
      (A$>"@")*C7:A=A*C6+B
JA 330 IF B<0 OR B>15 THEN AD=
      0:A=-1:J=2
GX 340 NEXT:RETURN
CH 350 B=INT(A/C6):PRINT MID$(
      H$,B+1,1);:B=A-B*C6:PRI
      NT MID$(H$,B+1,1);:RETU
      RN
RR 360 A=INT(AD/Z6):GOSUB350:A
      =AD-A*Z6:GOSUB350:PRINT
      ":";
BE 370 CK=INT(AD/Z6):CK=AD-Z4*
      CK+Z5*(CK>Z7):GOTO390
PX 380 CK=CK*Z2+Z5*(CK>Z7)+A
```

```
JC 390 CK=CK+Z5*(CK>Z5):RETURN
QS 400 PRINT"{DOWN}STARTING AT
       [4]";:GOSUB300:IF IN$<>
       N$ THEN GOSUB1030:IF F
       {SPACE}THEN400
EX 410 RETURN
HD 420 PRINT"{RVS} ENTER DATA
       {SPACE}":GOSUB400:IF IN
       $=N$ THEN220
JK 430 OPEN3,3:PRINT
SK 440 POKE198,0:GOSUB360:IF F
        THEN PRINT IN$:PRINT"
       {UP}{5 RIGHT}";
GC 450 FOR I=0 TO 24 STEP 3:B$
       =S$:FOR J=1 TO 2:IF F T
       HEN B$=MID$(IN$,I+J,1)
HA 460 PRINT"{RVS}"B$L$;:IF I<
       24THEN PRINT"{OFF}";
HD 470 GET A$:IF A$=N$ THEN470
FK 480 IF(A$>"/"ANDA$<":")OR(A
       $>"@"ANDA$<"G")THEN540
GS 485 A=-(A$="M")-2*(A$=",")-
       3*(A$=".")-4*(A$="/")-5
       *(A$="J")-6*(A$="K")
FX 486 A=A-7*(A$="L")-8*(A$=":
       ")-9*(A$="U")-10*(A$="I
       ")-11*(A$="O")-12*(A$="
       P")
CM 487 A=A-13*(A$=S$):IF A THE
       N A$=MID$("ABCD123E456F
       0",A,1):GOTO 540
MP 490 IF A$=R$ AND((I=0)AND(J
       =1)OR F)THEN PRINT B$;:
       J=2:NEXT:I=24:GOTO550
KC 500 IF A$="{HOME}" THEN PRI
       NT B$:J=2:NEXT:I=24:NEX
       T:F=0:GOTO440
MX 510 IF(A$="{RIGHT}")ANDF TH
       ENPRINT B$L$;:GOTO540
GK 520 IF A$<>L$ AND A$<>D$ OR
       ((I=0)AND(J=1))THEN GOS
       UB1060:GOTO470
HG 530 A$=L$+S$+L$:PRINT B$L$;
       :J=2-J:IF J THEN PRINT
       {SPACE}L$;:I=I-3
QS 540 PRINT A$;:NEXT J:PRINT
       {SPACE}S$;
PM 550 NEXT I:PRINT:PRINT"{UP}
       {5 RIGHT}";:INPUT#3,IN$
       :IF IN$=N$ THEN CLOSE3:
       GOTO220
QC 560 FOR I=1 TO 25 STEP3:B$=
       MID$(IN$,I):GOSUB320:IF
        I<25 THEN GOSUB380:A(I
       /3)=A
PK 570 NEXT:IF A<>CK THEN GOSU
       B1060:PRINT"{BLK}{RVS}
       {SPACE}ERROR: REENTER L
       INE [4]":F=1:GOTO440
HJ 580 GOSUB1080:B=BS+AD-SA:FO
       R I=0 TO 7:POKE B+I,A(I
       ):NEXT
QQ 590 AD=AD+8:IF AD>EA THEN C
       LOSE3:PRINT"{DOWN}{BLU}
       ** END OF ENTRY **{BLK}
       {2 DOWN}":GOTO700
GQ 600 F=0:GOTO440
QA 610 PRINT"{CLR}{DOWN}{RVS}
       {SPACE}DISPLAY DATA ":G
       OSUB400:IF IN$=N$ THEN2
       20
RJ 620 PRINT"{DOWN}{BLU}PRESS:
        {RVS}SPACE{OFF} TO PAU
       SE, {RVS}RETURN{OFF} TO
        BREAK[4]{DOWN}"
KS 630 GOSUB360:B=BS+AD-SA:FOR
       I=BTO B+7:A=PEEK(I):GOS
       UB350:GOSUB380:PRINT S$
       ;
CC 640 NEXT:PRINT"{RVS}";:A=CK
       :GOSUB350:PRINT
KH 650 F=1:AD=AD+8:IF AD>EA TH
       ENPRINT"{DOWN}{BLU}** E
       ND OF DATA **":GOTO220
KC 660 GET A$:IF A$=R$ THEN GO
       SUB1080:GOTO220
EQ 670 IF A$=S$ THEN F=F+1:GOS
       UB1080
AD 680 ONFGOTO630,660,630
CM 690 PRINT"{DOWN}{RVS} LOAD
       {SPACE}DATA ":OP=1:GOTO
       710
PC 700 PRINT"{DOWN}{RVS} SAVE
       {SPACE}FILE ":OP=0
RX 710 IN$=N$:INPUT"{DOWN}FILE
       NAME[4]";IN$:IF IN$=N$
       {SPACE}THEN220
PR 720 F=0:PRINT"{DOWN}{BLK}
       {RVS}T{OFF}APE OR {RVS}
       D{OFF}ISK: [4]";
FP 730 GET A$:IF A$="T"THEN PR
       INT"T{DOWN}":GOTO880
HQ 740 IF A$<>"D"THEN730
HH 750 PRINT"D{DOWN}":OPEN15,8
       ,15,"I0:":B=EA-SA:IN$="
       0:"+IN$:IF OP THEN810
SQ 760 OPEN 1,8,8,IN$+",P,W":G
       OSUB860:IF A THEN220
FJ 770 AH=INT(SA/256):AL=SA-(A
       H*256):PRINT#1,CHR$(AL)
       ;CHR$(AH);
PE 780 FOR I=0 TO B:PRINT#1,CH
       R$(PEEK(BS+I));:IF ST T
       HEN800
FC 790 NEXT:CLOSE1:CLOSE15:GOT
       O940
GS 800 GOSUB1060:PRINT"{DOWN}
       {BLK}ERROR DURING SAVE:
       [4]":GOSUB860:GOTO220
MA 810 OPEN 1,8,8,IN$+",P,R":G
       OSUB860:IF A THEN220
GE 820 GET#1,A$,B$:AD=ASC(A$+Z
       $)+256*ASC(B$+Z$):IF AD
       <>SA THEN F=1:GOTO850
RX 830 FOR I=0 TO B:GET#1,A$:P
       OKE BS+I,ASC(A$+Z$):IF(
       I<>B)AND ST THEN F=2:AD
       =I:I=B
FA 840 NEXT:IF ST<>64 THEN F=3
FQ 850 CLOSE1:CLOSE15:ON ABS(F
       >0)+1 GOTO960,970
SA 860 INPUT#15,A,A$:IF A THEN
        CLOSE1:CLOSE15:GOSUB10
       60:PRINT"{RVS}ERROR: "A
       $
GQ 870 RETURN
EJ 880 POKE183,PEEK(FA+2):POKE
       187,PEEK(FA+3):POKE188,
       PEEK(FA+4):IFOP=0THEN92
       0
HJ 890 SYS 63466:IF(PEEK(783)A
       ND1)THEN GOSUB1060:PRIN
       T"{DOWN}{RVS} FILE NOT
       {SPACE}FOUND ":GOTO690
CS 900 AD=PEEK(829)+256*PEEK(8
       30):IF AD<>SA THEN F=1:
       GOTO970
SC 910 A=PEEK(831)+256*PEEK(83
       2)-1:F=F-2*(A<EA)-3*(A>
       EA):AD=A-AD:GOTO930
KM 920 A=SA:B=EA+1:GOSUB1010:P
       OKE780,3:SYS 63338
JF 930 A=BS:B=BS+(EA-SA)+1:GOS
       UB1010:ON OP GOTO950:SY
       S 63591
AE 940 GOSUB1080:PRINT"{BLU}**
        SAVE COMPLETED **":GOT
       O220
XP 950 POKE147,0:SYS 63562:IF
       {SPACE}ST>0 THEN970
FR 960 GOSUB1080:PRINT"{BLU}**
        LOAD COMPLETED **":GOT
       O220
DP 970 GOSUB1060:PRINT"{BLK}
       {RVS}ERROR DURING LOAD:
       {DOWN}[4]":ON F GOSUB98
       0,990,1000:GOTO220
PP 980 PRINT"INCORRECT STARTIN
       G ADDRESS (";:GOSUB360:
       PRINT")":RETURN
GR 990 PRINT"LOAD ENDED AT ";:
       AD=SA+AD:GOSUB360:PRINT
        D$:RETURN
FD 1000 PRINT"TRUNCATED AT END
       ING ADDRESS":RETURN
RX 1010 AH=INT(A/256):AL=A-(AH
       *256):POKE193,AL:POKE1
       94,AH
FF 1020 AH=INT(B/256):AL=B-(AH
       *256):POKE174,AL:POKE1
       75,AH:RETURN
FX 1030 IF AD<SA OR AD>EA THEN
       1050
HA 1040 IF(AD>511 AND AD<40960
       )OR(AD>49151 AND AD<53
       248)THEN GOSUB1080:F=0
       :RETURN
HC 1050 GOSUB1060:PRINT"{RVS}
       {SPACE}INVALID ADDRESS
        {DOWN}{BLK}":F=1:RETU
       RN
AR 1060 POKE SD+5,31:POKE SD+6
       ,208:POKE SD,240:POKE
       {SPACE}SD+1,4:POKE SD+
       4,33
DX 1070 FOR S=1 TO 100:NEXT:GO
       TO1090
PF 1080 POKE SD+5,8:POKE SD+6,
       240:POKE SD,0:POKE SD+
       1,90:POKE SD+4,17
AC 1090 FOR S=1 TO 100:NEXT:PO
       KE SD+4,0:POKE SD,0:PO
       KE SD+1,0:RETURN
```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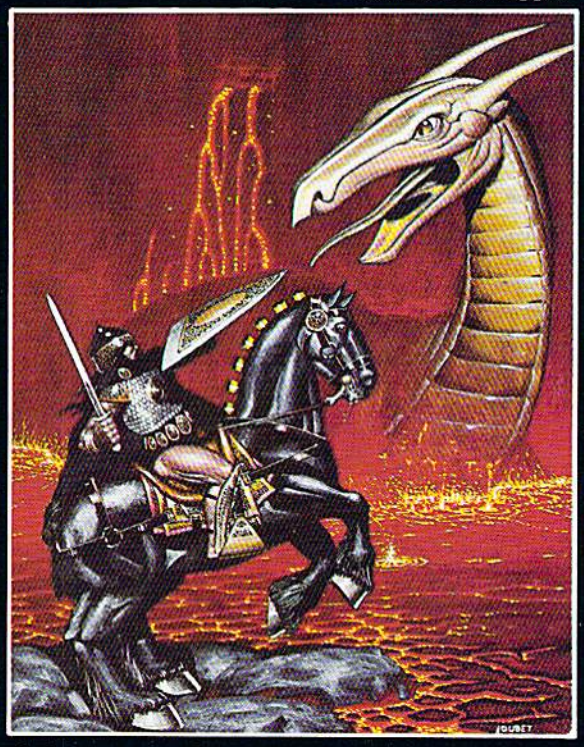

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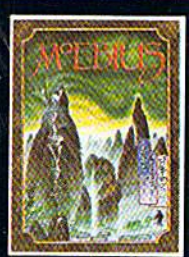

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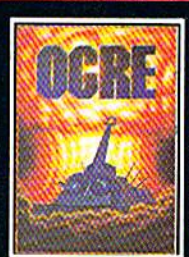

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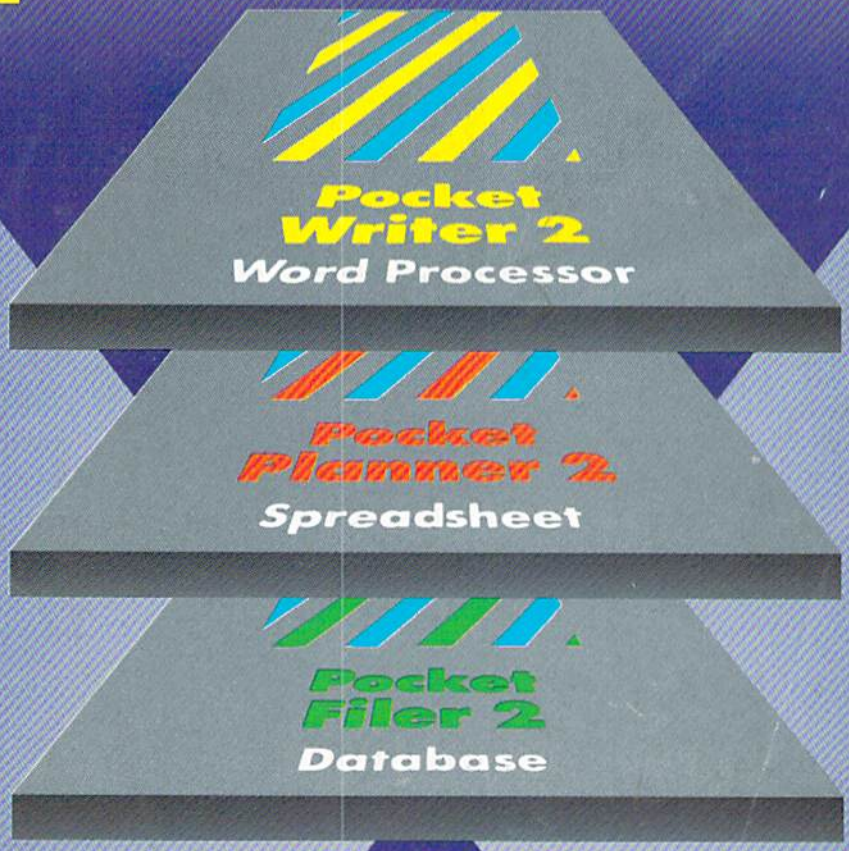

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